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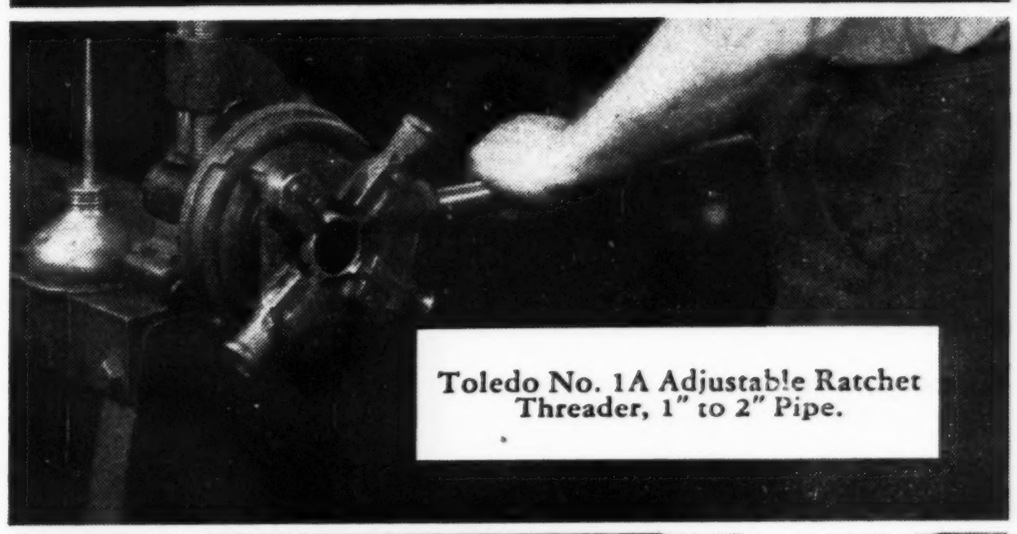

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GAS

REG. U. S. PATENT OFFICE

Twenty-Fifth Year of Publication

May, 1949 — **Vol. 25—No. 5**

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Highlights

ELECTRIC RANGE—"NEW CHAMP." Electrical cooking will outsell competitive fuels within five years, said Leonard C. Truesdell, Hotpoint's vice president, last month. He said electric range shipments in December exceeded gas ranges for the first time in history. He cited electric service costs deductions and better retailer profits as contributing causes.

C. GEORGE SEGELER MIGHT ADD OTHER CAUSES. See his article on pp. 28-30.

HILLYER BLASTS ELECTRIC OWNERSHIP OF GAS. Calling for separation of gas utilities, Hansell Hillyer, president of South Atlantic Gas Co., charged such companies "throttle the gas industry and prevent it from developing," and intimated that this condition was preventing natural gas from being introduced into Florida and Georgia areas.

TRUNKLINE APPLICATION DECISION RUSHED. As *GAS* went to press, oral arguments were proceeding on Trunkline Gas Supply Co.'s application to transport gas from Louisiana to Iowa. A decision by April 30 was imperative, as gas options were to expire on that date.

LEGISLATORS ARE BUSILY CONSIDERING GAS BILLS. Consider these developments, in Washington and in state capitals, in the past weeks:

MANY BILLS IN WASHINGTON, BUT THEY'RE NOT "HIGH" ON THE AGENDA. Four bills to amend the Natural Gas Act are being heard in the House. Measures authored by Lyle of Texas and Harris of Arkansas would prevent FPC's asserting jurisdiction over independent gathering and producing; Hall of New York proposes to free distributors from federal regulation based on the "continuous flow" theory; Dolliver of Iowa wants to have federal control of end use, a favorite coal industry scheme.

IN THE SENATE, ONE BILL. Senator Kerr, ex-Oklahoma governor, and Senator Thomas, also Oklahoma, are sponsoring a bill similar to the Harris-Lyle propositions. It effects a request of the Oklahoma legislature to "expressly exclude production and gathering, and arm's length sale."

NONE OF THESE AMENDMENTS HAS MUCH RESEMBLANCE TO MOORE-RIZLEY BILLS. Apparent apathy of the industry is surprising. Does the delayed confirmation of interim commissioner Buchanan hint that the balance of power on the commission may be an issue? What happens to Commissioner Olds after his term expires in June may hold an answer.

IN TEXAS, A WELTER OF TAX BILLS. Under consideration last month were measures to impose a .75 cents production tax; a 1½-cent gathering tax; a gas and oil liquids processing tax; an omnibus tax increasing by 10% all levies imposed by a previous bill, including gas production, and well-mouth value, gross receipts of gas utilities, franchises, and "chain store" operations; and a graduated gathering tax commencing with an original levy of 1½ cents per Mcf, increasing to 2½ cents where the market value is 8 to 10 cents, etc.

AND PRICE-FIXING BILLS. Senator Hazlewood's proposal calls for a 7½-cent floor on sweet, a 7-cent floor on sour produced in Texas-Panhandle and Texas-Hugoton fields. The Moore bill provides railroad commission arbitration on individual price disputes. Once again utilities are lined up against producers on both bills.

AND A STATE-WIDE PRORATION BILL. Also Moore-authored, this would substitute for field proration.

IN OKLAHOMA, MORE PRICE-FIXING. The senate passed a temporary 7-cent price floor, to be superseded by corporation commission order authorized under the same act. Senator Leonard, author, said the bill would clear up the question of the commission's authority to set the price, on which a test is now pending before the state supreme court.

AND IN KANSAS, CITIES SERVICE CHALLENGED A CORPORATION COMMISSION PRICE ORDER. The gas company filed a petition asking the U. S. district court to void an 8-cent fix.

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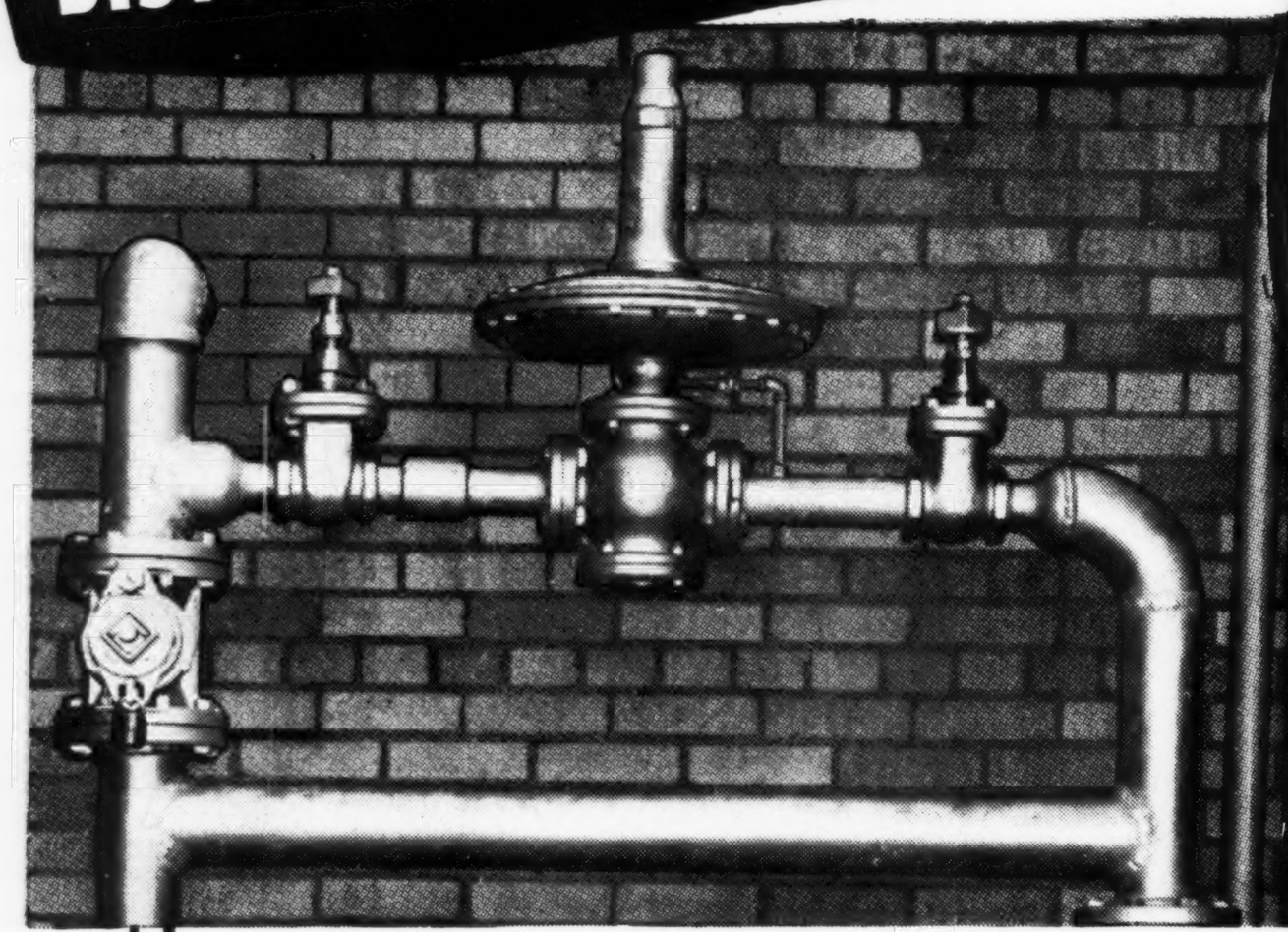

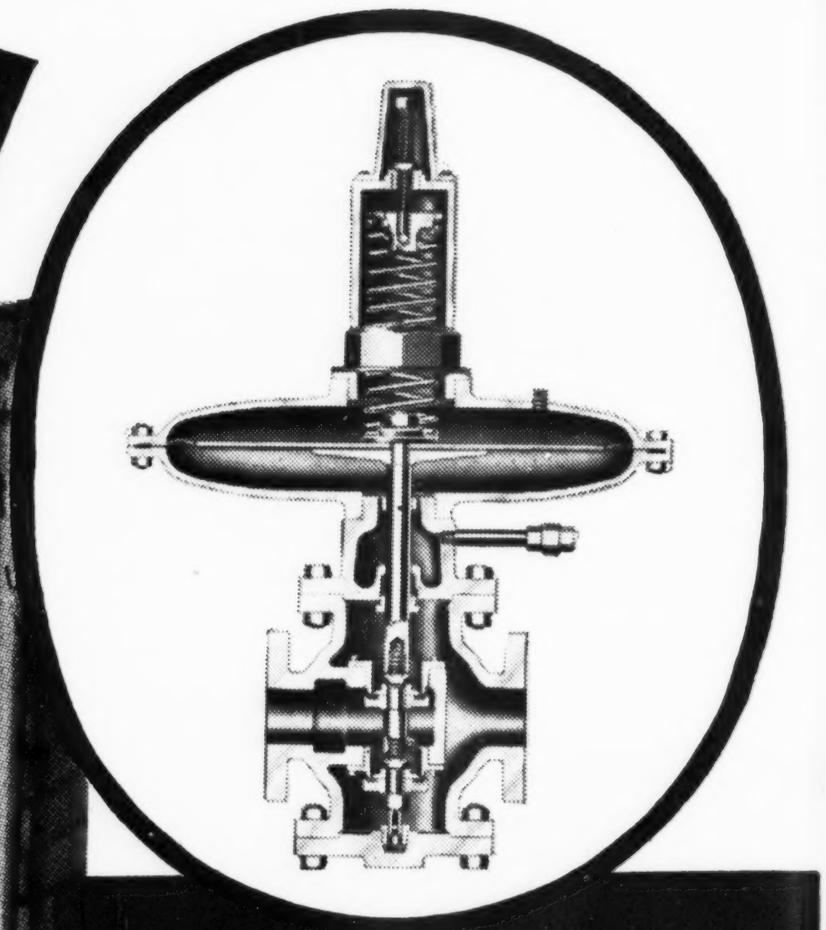

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THERMALLY THINKING

By EDWARD TITUS

first, washington

THERE'S PLENTY GOING ON this spring and much good, fast, smart thinking about the gas industry's plans for the immediate future. It's our purpose this time to give a quick cross-section of some of the best stuff we've heard this season in a rapid round of meetings and bull sessions.

First, however, a line or two about the Washington situation.

During the year since the last natural gas meeting in Houston, there was, first a rapid crescendo of optimism as it looked increasingly as if things would be much different in Washington this year; then there was the thud down to the depths early in November; but since then it has been a matter of gradually picking up the pieces, until now it actually looks as if sensible headway would be made in a Congress that at first glance looked so far left to some observers that nothing better than immediate progress toward real socialism could be hoped for. Some pointed out that about everybody on Capitol Hill who ever had ventured to carry the ball for the pro free-enterprise forces in utility matters and who had stood for re-election had been defeated.

lateral pass

What happened?

Others have come forward to carry the ball. It was pointed out in this space last December that consuming groups one of these days would wake up to the importance of the rational handling of gas matters; that senators and representatives from the states which produce gas would hardly vote for uneconomic legislation through which their states would lose out; and that the gas industry has a rightful cause in seeking to loosen the red tape that impedes distribution of this great natural resource, and in seeking definitions of authority and jurisdiction that will make it possible to know where one stands and to do business without getting a case of the jitters.

It now looks as if some kind of rational gas legislation may get at least the okay of the committee in the House before too long. While there probably won't be time to get the legislation through at this session, a good start will have been made if committee approvals are secured, and the legislation will then stand a good chance at the next session.

It is important also to note that those who want to straighten out and define and to some extent limit the power of the Washington authorities are carrying the ball, with legislation, instead of being on the defensive against what was feared might be a well-supported bill to carry out the fondest wishes of the Leftists. As pointed out here in March, the bill of Representative Lyle, Democrat from Texas, has provisions similar to the bill of Sen. Clyde M. Reed, Republican of Kansas, introduced at the last session. The Lyle Bill would resemble the commission's own rule, which exempts from the status of natural gas companies subject to federal regulation the producers not affiliated with interstate pipeline companies. It would mean that independent producers would not be depending on a rule of the commission which might be changed overnight by the commission itself, but on a law which could be changed only by Congress. Other bills which would accomplish approximately the same result are those proposed by Representative Harris of Arkansas and others.

what's the senate doing?

And on the Senate side the two senators from Oklahoma, Kerr and Thomas, have come forward with another bill which would exempt from FPC jurisdiction the independent producers and gatherers of natural gas.

Said Senator Kerr (a Democrat):

"No one has any question but that the intent of Congress, when it passed the Natural Gas Act in 1938, was to exclude independent producers and gatherers of natural gas from Federal Power Commission jurisdiction."

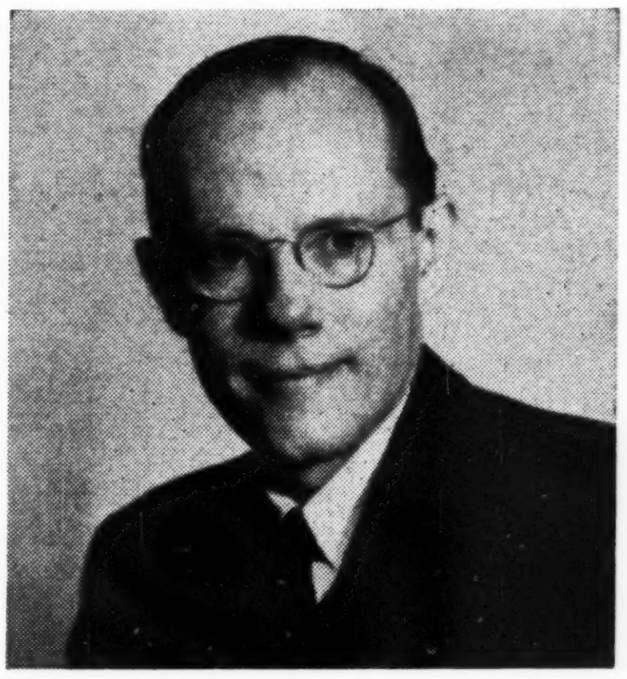
The Kerr-Thomas Bill was inspired by a resolution passed by the Oklahoma legislature calling on them to introduce the measure, and calling on members of the House from Oklahoma to support such legislation.

Determination of many on the Democratic side to get through some kind of clarifying legislation as soon as possible was illustrated by Representative Lyle's statement that

"This is the session of Congress to which the Federal Power Commission, as well as every independent producer or gatherer of natural gas has looked for positive legislation."

Present uncertainties and fears, Mr. Lyle declared, are resulting in the flaring of gas, draining of gas reserves, and failures of royalty owners and farmers to obtain the benefit of sale of gas underlying their lands.

FPC representatives were due to be heard before the House committee late in April, and soon the way will be open for committee action that will be the first step in getting somewhere with legislation.



Turning to high spots elsewhere, there's Brooklyn Union's new All-American Prize Fight Contest bringing in plumber-dealers with the theme:

"Are you a champ or a chump?"

With natural gas due in Brooklyn in the not-too-far-distant future, the company is determined to get plenty of modern automatic appliances out on its lines. A record of more than $5 million in appliance sales was rung up last year. And after a rip-roaring introduction in prize fight-like atmosphere, the company, backed by plumber loyalty built up through 20 years of good relations, is out to sell $6 million worth this year; and to heck with the competition.

Brooklyn is one of the brightest spots in the gas appliance picture.

Incidentally, it was Bill Hewson from Brooklyn who in Boston at the New England Gas Assn. meeting, telling what a plum the gas industry business might seem to the electric crowd, advocated that through good promotion, it be made an "indigestible plum."

those amazing electric ranges

Another talker at the Boston meeting, George Segeler of the American Gas Assn., dished out some statistical legerdemain of the electrical wizards that would be enough to make one's hair stand on end. It seems that phenomenal claims were made on economy through saving in shrinkage of meat in a certain cafeteria. But if these figures were correct, it appeared that the establishment's one three-deck conventional-sized oven would have had to turn out 487,272 servings of meat per month, and what a record that would be!

Segeler pointed out also that any claim that meat shrinkage is less with electricity is completely false. This has been established by every responsible agency that has studied the problem, including the Bureau of Standards, the National Live Stock and Meat Board, and many packers, and the Universities of Nebraska, Missouri, Chicago and many others.

It was a constructive thought that Mr. Segeler voiced when he pointed to the cost to the gas and electric industries of getting up elaborate data to attack the other fellow, often having to go to Washington with it. As he suggested, it would be well to save money by agreeing mutually on some method of measuring performance "and then proceed to sell our respective products on their own merits, and not by casting aspersions on our competitors."

codes and things

In Cleveland, at the Domestic Research and Utilization meeting, there was some good thinking looking to action on city building codes and many other matters.

As Frank Nugent, president of the Gas Appliance Manufacturers Assn. pointed out, there is an increasing tempo of city codes and ordinances. And there is strong necessity to keep an eye on specifications developed by various official bodies, including both agencies of the federal government and individual cities. The gas industry must be on its guard lest specifications are established that will be more easily met by competitive fuels.

And getting down to cases, George Segeler mentioned the Federal Housing Administration as an agency which all over the map is indirectly controlling what kind of fuel is used in the home.

He had received a letter from Florida stating that FHA required a 220-volt electric service outlet for a range and water heater in all houses except those for which the owner specifically demanded gas for cooking and water heating. Meanwhile someone from Providence, R. I., reported the FHA there had ruled that every house must be provided with a gas outlet for the range and water heater. In other words, these were completely opposite stands.

let's get acquainted

The conclusion drawn was that FHA rules are essentially local. FHA guarantees to the banks the repayment of mortgage money in the event of default, and the agency may therefore become the owner of any FHA guaranteed house. And apparently it is local conditions and local FHA personnel who control the writing of a lot of these rules.

It is recommended that every gas company be familiar with the rules of the local FHA, know the personnel, and take up with them the correct practices for gas appliance use. Meanwhile, if there are any unduly prejudiced people in Washington, let's find who they are and why.

Turning to Boston again, it's good to note that Orie Van Rye agrees with Charles Allen of Connecticut Light & Power that there's too much inflated gobbledy-gook in a lot of the official talk of management to employees.

Discussing current dangers of utilities being driven into the hands of government, and also discussing the help that employees can give in fighting such a tendency if they are properly informed, Mr. Van Rye told the Public Utility Advertising Assn.:

"One of the major problems will be to translate what we have to say in words that workingmen can understand. The only response such terms as 'free enterprise' and 'national economy' get from the average workman is that they associate them with the National Assn. of Manufacturers."

Mr. Van Rye urged that in communications with employees the employee be given a feeling of participation in company affairs, "that feeling of belonging, of self-importance that all of us crave."

There must, he said, be constant efforts to inform employees about management policies and objectives, since their future and that of their families is bound up with the future of the company.

nominations for oscars

An oscar should go to Brooklyn Union for the down-to-earth prize fight and kidding sort of way they're putting over the appliance campaign with the plumber-dealers; also to Tennessee Gas Transmission for the light human touch in their publication, *The Line*.

But for ability to make truly light entertaining reading out of an annual report, maybe one will have to turn outside the gas industry to the staid old Girard Trust Co. of Philadelphia.

Its 1948 report, in addition to being a regular primer of the banking business, kids the business to a large extent, and includes eight cartoons by Helen E. Hokinson, illustrating the problems of a middle-aged woman in the world of banks, trusts and finance.

Headway indeed is being made this spring.

Readers interested in natural gas transmission and the tremendous long-distance pipelines now under construction are referred to the Pipeline Section of this issue, which appears on pp. 83-120.

TECHNICAL TRENDS

by Guy Corfield

Oil and Gas Wells Go Deeper

WHENEVER ESTIMATES ARE MADE of our future oil and gas supplies, the optimistic group draws comfort from two assertedly promising and relatively unexplored regions — the offshore undersea areas, and the deeper earth strata. In a recent discussion in this column on tideland exploration and production, it was brought out that there seems to be no geological reason why oil and gas should not be found offshore, and the only problems are those of well drilling and maintenance, and a legal decision of federal vs. state ownership of coastal waters. Wells have already been drilled 30 miles offshore from artificial islands built to withstand hurricane velocities of 150 mph.

There would also seem to be good reason to expect petroleum at greater depths than so far penetrated by the drill, and we may soon have the answer as wells are pushed deeper and deeper. While it is hard to keep up with current developments, the most recent reports indicate that the record for drilling depth is held by Superior Oil, in California, in a well now 18,500 ft (3.5 miles) deep and still going down. The deepest *producing* well is also in California, operated by Barnsdall Oil, at a depth of 15,505 ft (2.94 miles). There are several other fields producing below 14.000 ft, and over 600 wells 12,000 ft or deeper.

The engineering and mechanical aspects are keeping pace with these increasing depths in spite of the formidable problems. In the above-mentioned 18,500-ft well, the weight of the drill pipe on the "hook" is 320,000 lb, and the derrick itself can carry 980,000 lb. Drilling rigs for 20,000-ft depth by rotary methods are designed and appear entirely practicable, being reasonably compact and even portable. The average cost per foot of depth of these deep wells, in 1948, was $25.57, which is a reduction of $2.44 over 1947. Greater knowledge of deep drilling problems and improvement in machinery and equipment have brought about the reduction.

Soil-Cement

A RECENT NEWS ITEM from the Ohio State University Research Foundation described a process whereby, for pavement of secondary roads, portland cement is mixed directly with the existing soil to form a "soil-cement" which for moderate service has proved quite successful. It is also used to some extent for other surfacing such as emergency airports. Where it will carry relatively heavy loads it is often covered with "black top." It has also been used to waterproof soil banks and ditches, and to stiffen sand fill under concrete and vitreous drain and sewer pipe.

This process has apparently been studied quite carefully so that the variables of soil type and moisture, and the requirements of mixing and curing, are fairly well understood. Obviously there would be certain types of soil more suitable for such treatment than others, and some soils might be definitely unfavorable. To offset this, it would be an easy and economical process to use, where soil reinforcement was desirable, as no materials would have to be hauled except the cement itself (and water in some instances), and in many cases no forms would be necessary.

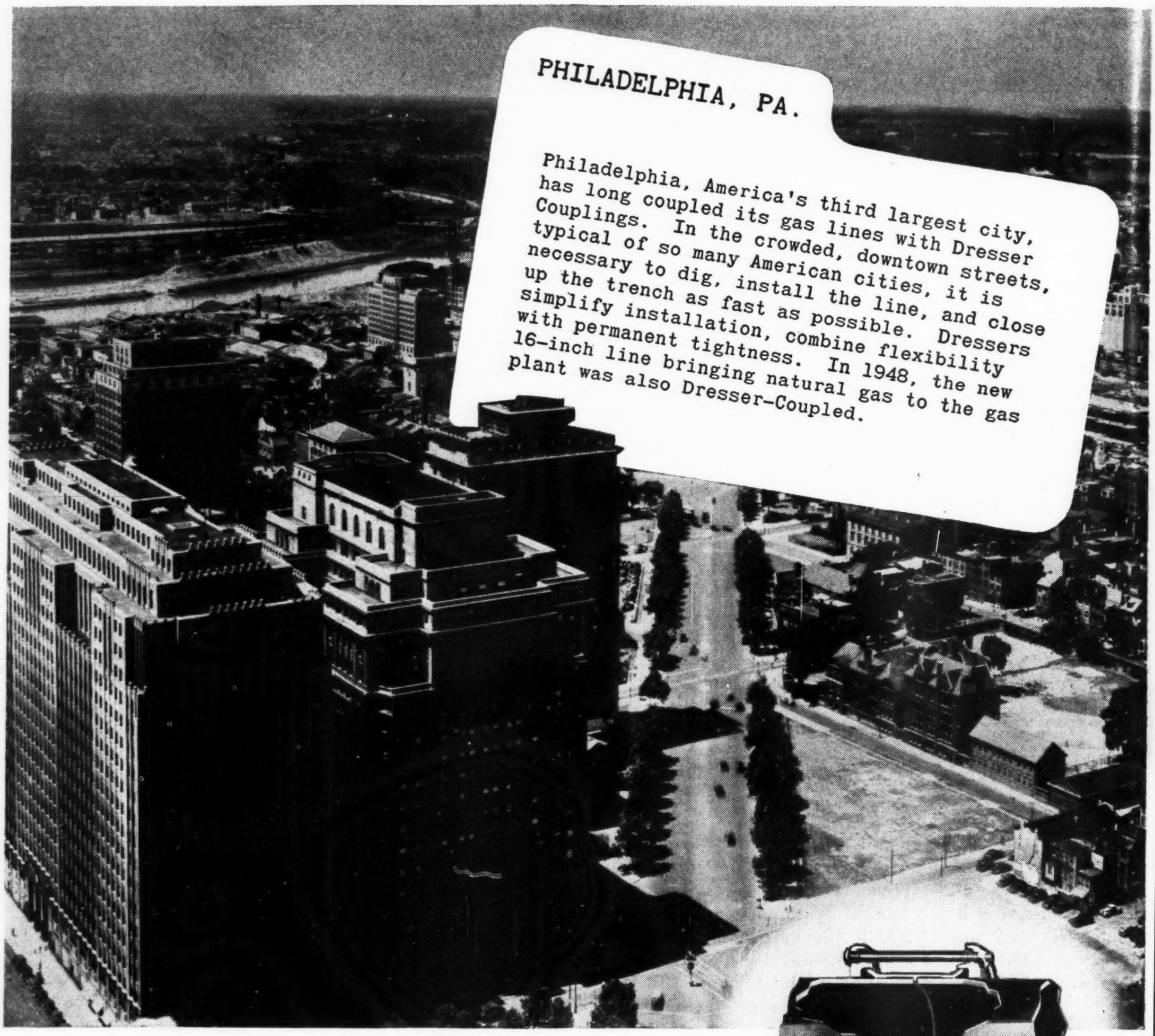
It would seem that this process would be of interest to the gas industry in connection with buried pipelines, under conditions where soil washout or settlement might damage the protective coating or put a stress on the pipe itself; or where reinforcement of the backfill might be desirable for other reasons.

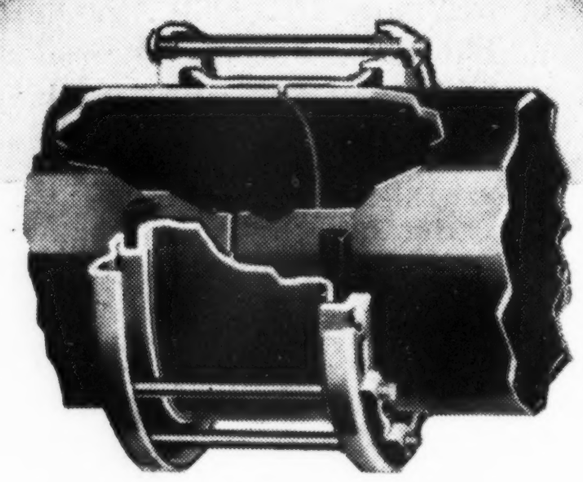
Lube Oil Additives

IT IS OBVIOUS that the constant advancements in internal combustion engine design must be paralleled by improvements in lubrication technology both as to type of oil and method of application to moving engine parts, and it is interesting to note what is happening to lubricating oils as the performance demands become higher and higher.

In earlier years, oil refineries bent their attention to purifying and blending the crude petroleum fractions, by distillation and solvent treatments generally aimed at removing undesirable constituents, and in a sense making the best of but not improving on the natural "mineral oil" product. Finally this was not enough, and the technology of "additives" developed, whereby non-mineral oil substances are added to produce or prevent certain results. These additives, except for general terminology, are in wide number and variety and largely shrouded in trade secrecy. To produce a given result, they may vary with different types of lubricating oil stock, and even the way they are added is said to be important. For some special purposes such as "extreme pressure" lubricants for hypoid gears, additives may assume the primary role in the mixture.

The most important types of additives are: oxidation inhibitors, to assist the oil in resisting breakdown due to oxidation at the high engine operating temperatures; pour point depressants, to lower the low temperature point at which the oil tends to form waxy solids; detergents, to keep pistons, rings and valve stems free of carbonaceous and sticky deposits; viscosity index improvers, to reduce the tendency of the oil to become thin at high temperatures and thick at low temperatures; anti-foam agents, to prevent lubricated surfaces from receiving froth rather than full oil supply; and friction- and wear-reducing agents for severe service to add "body" that could not be supplied by an oil film alone.


PHILADELPHIA, PA.
Philadelphia, America's third largest city, has long coupled its gas lines with Dresser Couplings. In the crowded, downtown streets, typical of so many American cities, it is necessary to dig, install the line, and close up the trench as fast as possible. Dressers simplify installation, combine flexibility with permanent tightness. In 1948, the new 16-inch line bringing natural gas to the gas plant was also Dresser-Coupled.



"FLEXIBLE-TIGHT" is a downtown byword

In heavily-travelled downtown streets, where speedy installation is essential, Dressers furnish the quickest, simplest method of pipe joining. Work progresses fast, and trenches can be backfilled immediately. No bulky joining equipment to jam the right of way.

Dresser-coupled lines give trouble-free service year after year. Resilient rubber gaskets in each coupling cushion the line against underground stresses. They absorb vibration, expansion, and contraction—keep the line *permanently tight.*

Where speed, convenience and long-time safety are important, make "Flexible-Tight" *your* downtown byword. Use time-proved Dresser Couplings. Write for detailed, factual literature.

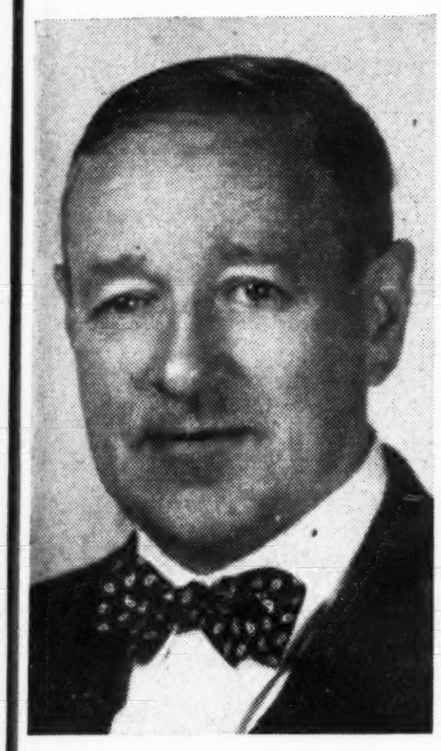
DRESSER "FLEXIBLE-TIGHT" **COUPLINGS**

Dresser Manufacturing Division 59 Fisher Ave., Bradford, Pa. (One of the Dresser Industries)—In Texas: 1121 Rothwell St., Houston
In Canada: Dresser Mfg. Co., Ltd., 629 Adelaide St., W., Toronto, Ont.—Sales Offices: New York, Chicago, Houston, San Francisco.

PROMOTIONAL NOTES AND NOTIONS

by Stanley Jenks

Using the User



IT'S NO NEWS BY NOW to gas men that the Edison Electric Institute, with the sincerest form of flattery, has organized a national promotional campaign for an all-electric kitchen. They should have made it an all-electric bedroom too, since so many of their membership, apprehensively eyeing our successes in the kitchen, are wisecracking that at least we don't have a gas blanket. Or a gas-fired radio or television set either!

Never discounting competition, no matter how false a premise on which the slogan "Of course—it's electric" is built, the kilowatt-cookooery boys admittedly have blood in their eyes, and mean business.

Undoubtedly we can expect the old "meat shrinkage" baloney, the canary singing blithely in the kitchen (no noxious fumes), and the hokum routine of wiping used pots and pans with silk handkerchiefs to demonstrate the cleanliness of "flameless" cooking. There'll be new tricks, too; you can rest assured of that.

But, of course, we have already better than 20 million customers cooking with gas, of whom approximately 4 million bought new gas ranges in 1947 and 1948, and we estimate another 2 million will buy new gas ranges this year.

Modern gas ranges, particularly those built to CP standards, are definitely competition-proof. Our vulnerability obviously lies in the old-timers, lacking modern controls and refinements, but built like a battleship never to wear out. The prompt replacement of these is a "must," and the good old local system of using the modern gas range user is indicated. It is assumed that these relics of less exacting times are spotted. The job, therefore, is to get them out of the kitchen and on the junk pile, where they can no longer threaten our progress.

Business-managed

AS SHAKESPEARE SAID, a rose smells just as sweet no matter how you name it. But in the promotional world, the proper word is most important, because it can be made to imply so much by association of ideas.

Through the years, we have used the words "publicly owned," meaning politically parasitized as far as utility operation is concerned when bureaucratic bumbledom moves in, compared with our present energetic, progressive, so-called "private" ownership.

But today, our gas utilities, especially, are publicly owned by hundreds of thousands of stockholder owners, who have invested their own taxable money to earn a fair return, and who expect their funds to be managed carefully and expertly.

Therefore, I like "business-managed utilities," a phrase I came across in the 1948 annual report of The Connecticut Light and Power Co., which, incidentally, under the leadership of President Bob Knowlton, ranks among the best business-managed utilities in the good old U.S.A.

Sell the Menfolk

AMONG THE NINE BASIC conclusions to be incorporated in the program to sponsor this year's national automatic water sales campaign is one that states that more selling must be directed at men, because they participate in 91.2% of family decisions to buy water heaters.

Anybody who has rung doorbells has heard, "Well, I'll have to discuss it with my husband."

The facts are that most women are inherently opposed to new labor-saving devices, among which an automatic water heater ranks pre-eminently. In addition to assuming the cost, the wage-earner, in most instances, has to take up where the salesman has left off and "sell" the missus.

Therefore, the suggestion that selling effort be directed at the man of the house is a most important point.

Telling and Selling 'Em

THE BROOKLYN UNION GAS CO. has always been in the forefront in enlisting the active aid of appliance dealers in solving its promotional problem in the residential field. Vice President Hugh Cuthrell through the years has come to be recognized throughout the gas industry as a pioneering expert in dealer cooperation.

A recent Brooklyn Union advertisement in a local plumber publication pulls no punches. Headed "You'll Sell Gas Appliances to Beat the Band in '49" *(and they will)*, the copy reads:

> How do we know? Just listen. The Brooklyn Union Gas Co. is planning one of the most aggressive gas appliance promotions in its history. From one end of 1949 to the other, there will be a colorful parade of advertising and promotion planned to reach every gas user in Brooklyn and Queens.
>
> Actually, this is *your* advertising program. For every advertisement . . . every piece of promotional material . . . will advise interested prospects "to see your neighborhood plumber dealer." *We'll tell them. You'll sell them.* (The italics are ours.)

Honestly, any gas company that faces facts by sincerely telling its customers and encouraging appliance dealers to sell 'em cannot miss promotionally, now that the battle of the fuels is really here.

TO A NATURAL GAS PRODUCER

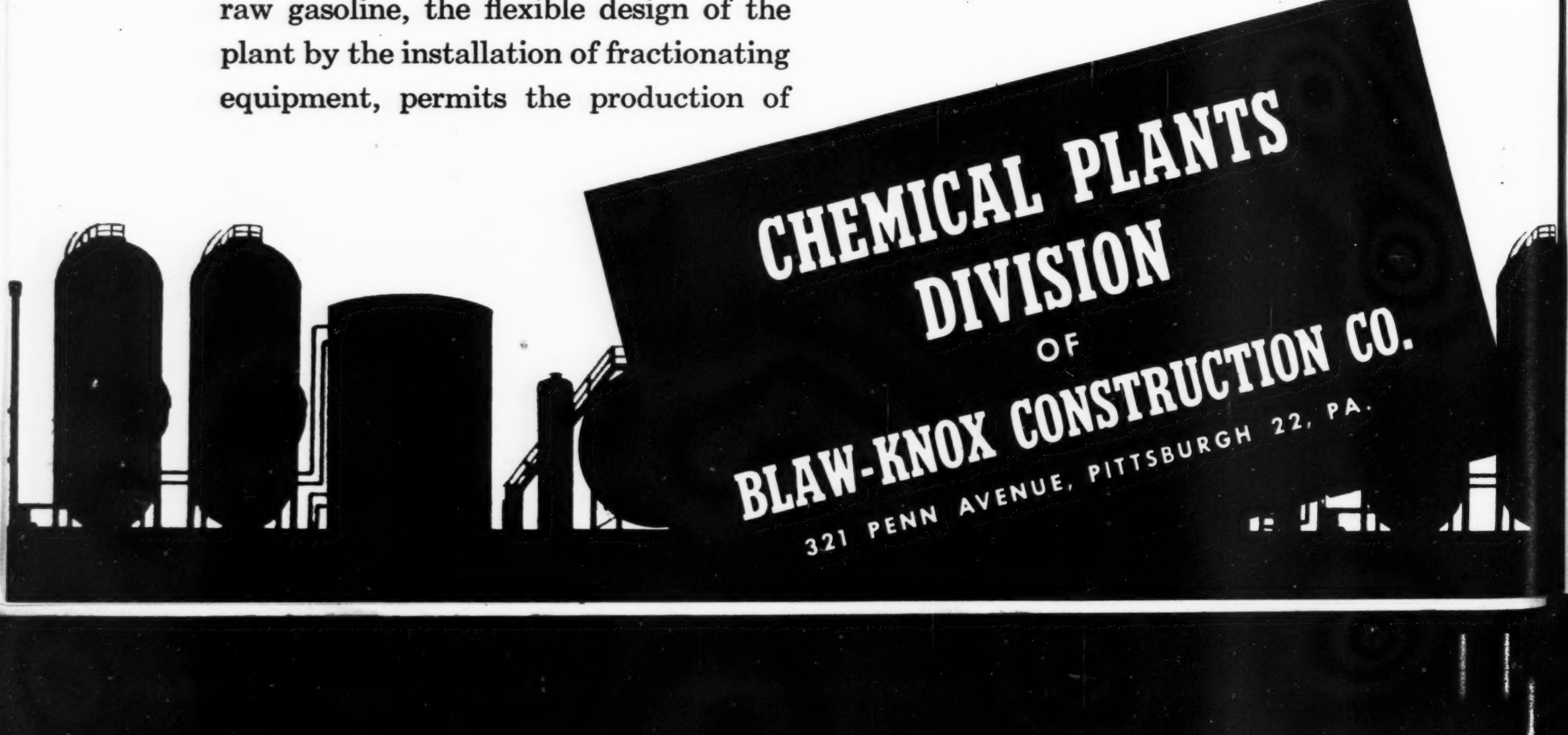
Meet transmission requirements by removing condensible hydrocarbons, then profit from their recovery with this compact Gasoline Absorption and Stripping Plant that *pays for itself in 2 to 3 years.*

This continuously operating Gasoline Absorption and Stripping Plant with automatic control requires only daily operational check-up. It may be easily dismantled and readily transported to another site for reassembly at low cost.

In addition to removal of condensible hydrocarbons and their recovery as a raw gasoline, the flexible design of the plant by the installation of fractionating equipment, permits the production of stabilized gasoline and liquefied petroleum gases. This enables you to meet varying market demands. Ask for Bulletin 2225.

★ ★ ★

The above is illustrative of the modern creative engineering approach of Blaw-Knox. In addition to complete plants Blaw-Knox supplies process equipment and machinery. An engineer-to-engineer discussion is invited.



CHEMICAL PLANTS DIVISION
OF
BLAW-KNOX CONSTRUCTION CO.
321 PENN AVENUE, PITTSBURGH 22, PA.

Emphasis on Natural Gas As Spring Meeting Convenes

LAST March a number of prominent New England gasmen, schooled in the manufacture of gas, listened attentively while a natural gas expert explained for them the future of the natural product in New England—knowing as they did that it's only a matter of time until they will have to decide how they are going to utilize this great fuel.

Later the same month, the Federal Power Commission approved a plan to construct another major long-distance gas transmission line—this one from Texas to Ohio.

Greatest of All

This month, construction is to start on the greatest line of them all—to date — Trans - Continental's Texas - to-New York City line.

In Congress, legislators are once more giving attention to the administration of federal law governing interstate movement of natural gas, endeavoring to find a happy medium between unrestricted operations and governmental regulation which will best serve the public interest.

And finally, in Texas, twin movements to dam the flow of native gas past the state's borders and to obtain added tax revenue from what is now flowing are still gaining ground.

All these developments are reported in detail in this issue, because at this time they take on added significance. This is the month of the spring meeting of the American Gas Assn.'s Natural Gas Department—one of the two meetings during the year when manufactured gas talk is practically taboo.

There are other extra features in this month's *GAS* as well—for example, an extensive Pipeline Section devoted to late progress reports on pipeline jobs, a map showing last year s major construction activity, and a survey of 1949 utility expansion plans—plus the usual quota of news and feature articles.

The natural gas meeting will enjoy a two-day run at the French Lick Springs hotel, French Lick, Ind., May 9-10. There over 600 delegates will turn their attention to one of the most timely of subjects—how to meet peak loads. The entire second day of the convention will be devoted to this all-important topic, giving consideration to catalytic reforming and thermal cracking, pipe batteries, storage and underground reservoirs, and propane.

Speakers on these topics in the order above, are Edwin L. Hall, AGA Testing Laboratories director; Fred P. Hough, vice president, Southern Counties Gas Co., Los Angeles; Max W. Ball, ex-director of the Interior Department's oil and gas division; and A. B. Lauderbaugh, Manufacturers Light & Heat Co., Pittsburgh.

Program

The first day's program will present Robert W. Hendee, AGA president, talking on association activities; William J. Murray, Texas Railroad Commission chairman, discussing natural gas problems in the leading natural gas-producing state; Arch M. Booth, general manager of the United States Chamber of Commerce, depicting the place of the gas industry in the nation's business outlook; and Glenn Clark, vice president and general counsel, Cities Service Gas Co., Oklahoma City, reviewing recent regulatory events of importance to the gas industry.

Presiding over both sessions will be D. A. Hulcy, Lone Star Gas Co. (Dallas) president, who is AGA vice president and chairman of the department. E. F. Schmidt, Lone Star, arranged the program.

It is to this outstanding event that this annual "Natural Gas Issue" is dedicated.

Tremendous Utility Expans gr

Ninety-five major gas utility comp panies are prepared to spend nly a million in 1949 for new con ng pi tion that will permit them to e. their customers with many mi ce a more in cubic feet of gas than ral G before. Big plans are in the u naries with important changeovers to d in ral gas leading the way. An leted

Amarillo (Texas) Gas Co. is spending $275,000 in 1949 for additional mains and feeder mains. Approximately 13 miles of line will be laid, serving only the city of Amarillo.

Arkansas Power & Light Co., Pine Bluff, will build 50 miles of mains and other distribution facilities, costing in aggregate $240,000. Added sendout would total 682,565 Mcf a year.

Bridgeport (Conn.) Gas Light Co. will spend $730,000 this year to complete projects already under way: $500,000 for a new 5 MMcf water gas holder; $200,000 for new mechanical purification equipment of 60,000-bu capacity; $10,000 for finishing work on new station meter and house; $20,000 for compressor station and house. Additional main extensions and other distribution work will be performed; cost has not as yet been determined. This is part of a two-year program that started in 1947 and will be completed in July, 1949, costing $2.6 million. There will be no increase in sendout, but the construction will result in better load conditions on sets and better load conditions in local areas.

Brooklyn's Plans

Brooklyn (N.Y.) Union Gas Co. has allocated $5 million for 1949 of which $3.5 million applies to the general expansion program, $1 million to the natural gas program, and $500,000 to miscellaneous construction. All the construction outlay except for miscellaneous is part of two programs already under way. One begun in 1945 will be completed this year and total cost is estimated at $23 million. The plan called for installation of five water-gas sets with auxiliary plant equipment such as condensers, exhausters, cottrells, scrubbers and purifiers; LP-Gas storage and equipment; conversion of a Williamson water-gas set to the oil-gas process; installation of additional compressor capacity in existing stations; and construction of a new outlying compressor station. It also included new transmission mains and construction of two waterless holders. In addition, coke oven batteries were overhauled and equipped with self-sealing doors and auxiliary equipment. Through this program, 6000 Mcf will be added in 1949 to the 89,000 Mcf installed since 1945.

Scheduled to commence this year is a $4.5 million program to receive and utilize natural gas. It will be completed in 1950 and will enable the company to receive 60,000 Mcf of natural gas per day from the Trans-Continental line. Plans call for installation of about 12 miles of welded steel mains, varying in size from 10-in. to 24-in., to connect with lines to be installed by Consolidated Edison to supply gas to BU and other Brooklyn gas companies. Equipment will be installed for reforming natural gas and for using it for enrichment.

Routine construction this year will include three miles of natural gas supply lines and about 17 miles of distribution mains.

Cambridge (Mass.) Gas Light Co. will spend $311,125 this year, mainly on production facilities. Included are $217,800 for production, $72,250 for mains, meters and services, $14,575 for transportation equipment, and $6500 for office equipment. Now on Twin Generator Oil Gas No. 2 oil, the company plans to change to a two- or four-shell heavy oil process.

Central Arizona Light & Power Co., Phoenix, has allocated $970,300 for construction in 1949 to meet rapid gains in customers. (In 1948, the company added 8966 to its lines, a gain of 25% over the previous year.) The entire outlay will be dedicated to construction of distribution facilities, including 128 miles of lines. One new town —Scottsdale—will be added to the system.

Central Electric & Gas Co., Lincoln, Nebr., plans to spend $785,000 for 15 miles of distribution mains; meters, regulators, and services; and 10 additional propane storage tanks. The new construction will make available an additional 6000 Mcf daily for firm service and 10,000 Mcf for peak loads.

Central Hudson Gas & Electric Corp., Poughkeepsie, N.Y., has allocated $309,100 for this year's portion of a $2 million program started in 1946 and scheduled for completion in 1950. Production and transmission facilities will total $193,800 and the remaining $115,300 will be used for 2000 ft of distribution mains, as wells as meters and governors.

Central Indiana Gas Co., Muncie, will spend $450,000 this year for construction necessitated by normal growth. The allocation will be divided with $50,000 for production, $300,000 for distribution, and $100,000 for miscellaneous.

Cheyenne (Wyo.) Light Fuel & Power Co. will increase its annual sendout by 160,000 Mcf through construction of seven miles of distribution mains in Cheyenne and vicinity. Cost of the program is $135,000.

Citizens Gas & Coke Utility, Indianapolis, will spend $500,000 this year as part of a $3 million program begun in 1948. Construction consists of 40 miles of 24-in. distribution line to be laid in Indianapolis. The program will be completed in 1951.

City of Pensacola (Fla.) Gas Co. has allocated $50,000 for about five miles of general distribution main extensions, services, and meters. The construction will provide an additional 28,000 Mcf annually for firm service, and 70 Mcf hourly for peak load periods.

City of Richmond, Va., Dept. of Public Utilities is carrying forward the $3.5 million program begun last year by spending $530,000 during 1949 for construction of production and distribution facilities. An LP-Gas plant for peak shaving, a 500 Mcf/hr compressor, and rearrangement of production equipment will account for $350,000; $180,000 will go for 19 miles of distribution mains, services and meters. Daily peak sendouts will be increased by 18,500 Mcf and firm service by 14,000 Mcf. The LP-Gas plant will produce the 4500 Mcf needed for peak loads.

City Public Service Board, San Antonio, Texas, appropriated $1,269,200 for the fiscal year ending Aug. 1, 1949. The money will be spent for construction of 66 miles of distribution lines and 66½ miles of service lines. The project will increase firm service sendout by 700 Mcf per hour.

119 Miles of Mains

Coast Counties (Calif.) Gas & Electric Co.'s budget of $1,613,093 is made up of about $1,040,000 for 119 miles of distribution mains, services and meters to serve additional customers throughout the system; $190,000 for projects designed to augment the system in rapidly growing areas, particularly southern Contra Costa county; the balance, approximately $380,000, for replacements, additions to land and buildings, office equipment, tools, and auto. The 1949 projects are expected to make available for sendout about 313 Mcf per hour, 47 Mcf of which will probably be required for firm customers added during the year.

Columbia Gas System's subsidiaries propose to spend a gross amount of $60,918,000 during 1949. Construction planned for the year is part of a five-year program which began in 1946. Expenditures under this program will total approximately $159 million through 1949. This year's appropriation is divided as follows: Production, $13,839,000; transmission, $37,309,000; distribution, $7,654,000; and general, $2,116,000. More than 600 miles of transmission lines and 350 miles of distribution mains will be installed. Drilling of 189 gas wells, 27 oil wells, and 106 storage wells is contemplated.

Included in this information is the construction program of Ohio Fuel Gas Co., a subsidiary of Columbia, which is also listed separately.

...sp...grams Under Way in 1949

...ity ...companies, 1949 expenditures ...nd ...nly a portion of a larger, con... ...ons...ng program to improve their ... to ...ce.

...mi...ce again, as a feature of our ...han...ral Gas issue, GAS presents ...e w...naries of utilities' plans as re... ...s to ...d in an exclusive survey just ...An...leted by its editors.

Community Public Service Co., Fort Worth, Texas, has earmarked $145,000 for the 1949 portion of a $500,000 program initiated last year and scheduled for completion in 1953. Transmission projects will cost $54,000; distribution and services, $71,000; meters, $12,000; miscellaneous, $8000.

Consolidated Gas Electric Light & Power Co. of Baltimore has allotted $4.9 million for the 1949 expansion program. The company's gas division plans to expend $18.4 million during the period 1949 through 1953. Distribution facilities, including 35-40 miles of pumping and distribution mains, will cost $3.6 million, and $1.3 million is to be expended for production this year. Additional sendout of 10,000 Mcf daily will be made available. Although no changeover is contemplated in 1949, the company hopes to obtain natural gas, in which case changeover would probably take place in 1950 or 1951.

Consumers Gas Co., Reading, Pa., has allocated $244,200 for this year's construction. The largest amount—$154,700—was apportioned for distribution, including 6 miles of mains, customers plant, and miscellaneous. Transportation expenditures will total $45,000; production, $32,000; general, $12,500.

Consumers Power Co., Jackson, Mich., plans to lay 12.2 miles of transmission lines and 76 miles of distribution lines as part of its $2,857,800 program for the year. Other expenditures will be for miscellaneous gas production plant, transmission plant, pumping and regulating equipment, new business, and system improvements. Manistee, Mich., will be changed over from 530-Btu manufactured gas to 1000-Btu natural gas during the year.

Dayton (Ohio) Power & Light Co. will spend $880,000 for 103 miles of 3-in. equivalent distribution mains during 1949. The new lines will increase peak load sendout by 10,000 Mcf daily.

Delaware Power & Light Co., Wilmington, estimates it will spend $2.8 million in expansion projects from 1949 to 1953. This year $570,000 will be used—$480,000 for distribution and $90,000 for production facilities. Sixteen miles of 2- to 8-in. distribution main will be laid during 1949. An additional 13,000 Mcf per day will be available for firm demands.

Dept. of Public Utilities, Corpus Christi, Texas, started an $800,000 expansion program in 1947 which will probably be completed in 1952. This year's allotment of $160,000 will be used for distribution facilities to accommodate 1200 new consumers and will include about 30 miles of high pressure and low-intermediate pressure mains. Peak daily sendout will be upped by 2000 Mcf.

Detroit (Mich.) Edison Co. has allocated $79,000 for production and $167,900 for distribution for a total 1949 expansion program expenditure of $246,900.

Nine Million

East Ohio Gas Co., Cleveland, will spend $9 million this year, more than half of it for distribution facilities, including 175 miles of mains and a 4400-hp compressor station. Division of the money will be about like this: Production, 7.25%; storage, 16.83%; transmission, 18.98%; distribution, 52.94%; general, 4.01%.

Gulf States Utilities Co., Baton Rouge, La., will improve its distribution system with projects totaling $550,000. Of this sum, $425,000 will be used for extension of mains and services, meters, and regulators to serve new customers. The balance, $125,000, is to be used for distribution system reinforcement. About 40 miles of mains will be laid, and the new facilities will increase peak hour sendout 150 Mcf.

Harrisburg (Pa.) Gas Co. plans, as part of its $924,300 program, to extend service to the Carlisle, Pa., area. The newly acquired territory will be changed from carburetted water gas to coke oven gas. Expenditures include $572,000 for completion of a catalytic gas plant started in 1948, $346,200 for miscellaneous works and distribution improvements, and $300,000 for 15 miles of transmission line to Carlisle. Peak load sendout will be increased by 5000 Mcf per day.

Hartford (Conn.) Gas Co. started a $3.5 million expansion program in 1946, and construction amounting to $900,000 will be completed this year. New distribution mains will total 13 miles and sendout will be increased by 14,000 Mcf daily for firm service and 16,000 Mcf for peak load periods. Of the $900,000 allotted for 1949, $370,000 will be spent for production, $50,000 for transmission, $450,000 for distribution, and $30,000 for general. The new projects are expected to remove plant bottlenecks which followed installation of a water gas set in 1947.

Houston (Texas) Natural Gas Corp. will install 170 miles of distribution lines and 5 miles of transmission line to serve an additional 18,500 customers. Capital expenditures will amount to about $2 million.

Indiana Gas & Water Co. Inc., Indianapolis, plans to complete this year a $2,550,000 program begun in 1946. Allocations for 1949 total $950,000 and are divided as follows: Production, $34,000; distribution, $571,000; transmission, $83,000; buildings, $150,000; and miscellaneous transportation and other equipment, $112,000. Peak load sendout will be upped 5000 Mcf per day. Six miles of line will be laid.

Interstate Power Co., Dubuque, Iowa, will spend $52,000, most of its 1949 allocation, for distribution facilities. The remaining $3400 is earmarked for production properties. Hourly peak load sendout will be increased by 50 Mcf as a result of the year's projects.

Iowa Electric Light & Power Co., Boone, will spend $108,500 for routine extensions to existing distribution systems in nine towns now being served.

Iowa-Illinois Gas & Electric Co., Rock Island, Ill., plans to build distribution facilities, including 51 miles of main lines, with the $1,275,000 allocated for 1949 expansion. This is part of a $2,185,000 program initiated in 1948.

Iowa Power & Light Co., Des Moines, has allocated $400,000 for distribution facilities, $85,000 for transmission, and $15,000 for production for a 1949 total of $500,000. Sendout will be increased 4000 Mcf per day for firm service and 300 Mcf per hour for peak loads.

Laclede Gas Light Co., St. Louis, expects to change St. Louis county from 800-Btu mixed gas to natural gas of about 1000 Btu. Conversion of the city, itself, will follow in 1950. A $15 million program was begun in 1948 and $2,250,000 will be expended this year: $120,000 for production, $1,880,000 for distribution, and $250,000 general. Plans include 66 miles of mains to be laid during 1949. The program is scheduled to be completed in 1952. Any additional gas supply is dependent upon completion of a looping program by the Mississippi River Fuel Corp., the company's supplier.

Lone Star Gas Co., Dallas, and its subsidiary, Lone Star Producing Co., plan to spend a total of $19,769,300 for projects which include 200 miles of transmission and gathering lines and 300 miles of distribution lines. Production facilities will cost $4,422,300; distribution, $8,608,300; and transmission and gathering, $6,738,700. The program will make available an additional 200 MMcf per day of natural gas and 2.5 million gal per year of LP-Gas.

Long Island Lighting Co., Mineola, N.Y., will build 860 miles of distribution mains and 4 miles of transmission line this year. Total expenditures for distribution will be $2.5 million; for transmission, $1.4 mil-

lion; storage, $1 million; production, $1.8 million. The $6.7 million allocated for this year is part of a $12.5 million program planned for 1948-51.

Louisiana Power & Light Co., New Orleans, will spend $600,000 for distribution facilities, including 40 miles of mains.

Lynn (Mass.) Gas & Electric Co. will spend $330,000 of its 1949 appropriation to complete a $925,000 program begun in 1947. Of this year's total ($450,000), $75,000 is labeled transmission, $120,000 for distribution, and $255,000 for production. Changeover from mixed coal and water gas to straight water gas during the year is contemplated.

Manchester (N.H.) Gas Co. has allocated $88,325 to improve service to local areas. The amount is divided as follows: Production, $24,650; distribution, $63,675.

Back to Natural

Michigan Consolidated Gas Co., Detroit, has set aside $12,280,000 for its 1949 construction program. Breakdown of expenditures looks like this:

Manufactured gas facilities	$ 169,000
Natural gas facilities (storage and production fields)	427,000
Transmission lines (65 miles) pumping and regulating equipment	2,413,000
Services, meter and regulator installations	3,055,000
Meters and regulators	397,000
General plant structures	27,000
Office furniture and equipment	162,000
Transportation, tools and equipment	848,000
Rehabilitation of leased distribution system	10,000
Miscellaneous	72,000

This program includes 225 miles of distribution mains and will increase sendout by 42,000 MMcf per year for firm service and 309 MMcf daily for peak loads by 1951. By 1950 the company, which as an emergency measure has been using manufactured as well as natural, expects to revert back to all natural gas. This will be coincident with the completion of the Michigan-Wisconsin pipeline from Texas. At that time it is expected that restrictions on gas usage will be lifted.

Minneapolis (Minn.) Gas Co. will spend $2,491,710 this year for projects which include 35 miles of distribution mains and 4814 services. Of the total appropriation, $313,300 has been designated for production; $1,818,820 for distribution; $338,990 for general improvements; $2500 for franchises; $11,000 for delayed 1948 charges; and $7100 for preliminary engineering. Firm sendout will be increased by 10,000 Mcf daily and 12,000 Mcf of LP-Gas will be available for peak load sendout. Service will be extended to the town of St. Anthony.

Montana-Dakota Utilities Co., Minneapolis, will spend $1,750,000 to maintain existing capacity. The $750,000 for distribution facilities includes construction of about 20 miles of mains. Transmission projects claim $250,000 of the balance, and the remaining $750,000 is for production.

Montana Power Co., Butte, will use most of the $870,500 appropriated for the year to build production facilities. The breakdown is production, $640,000; distribution, $222,500; transmission, $8000. Included are 10 miles of distribution lines.

Mountain Fuel Supply Co., Salt Lake City, has specified that about $2 million each will be spent for production, transmission, and distribution. The $6 million allocation provides for 32 miles of 20-in. transmission line. Projects scheduled for the year will increase firm sendout by 20,000 Mcf per day—all natural gas.

Municipal Gas Dept., Long Beach, Calif., is working on a two-year (1948-49) budget of $453,142. This is part of a $2 million program started in 1945 and scheduled for completion in 1951. This year's expenditures—70% for transmission and feeders and 30% for distribution mains—will increase sendout about 25% or 10,000 Mcf of natural gas by 1951. Fifteen miles of transmission line and 30 miles of distribution lines are being built in 1949.

Nashville (Tenn.) Gas & Heating Co. plans to spend $500,000 for new distribution facilities. Thirty-five miles of mains will be laid, and peak load sendout is expected to be upped by 7000 Mcf per day.

New Orleans (La.) Public Service Inc.'s entire appropriation of $2,375,545 will be used for distribution improvements, including 56 miles of mains. Other projects will be relocation of meter and repair shops, retirement of gas plant buildings and equipment, connecting large residential subdivisions and large commercial and gas loads, renewing and reconditioning gas distribution system in connection with street paving or other city work, etc.

New York State Electric & Gas Corp., Ithaca, is continuing a long-range program started in 1939. This year's $824,000 will be broken down as follows: Distribution, $572,000; transmission, $214,000; production, $35,000; and general, $3000. New distribution mains will total 34 miles, and 13 miles of transmission line will be laid.

New York State Natural Gas Corp., Pittsburgh, Pa., has allocated $1.8 million for the 1949 portion of a program started in 1945. The entire appropriation is labeled transmission, and this includes 45 miles of line. The expansion will benefit various areas in Pennsylvania and western New York.

North Penn Gas Co., Port Allegany, Pa., plans to build system extensions to three communities—East Fork, Sweden Valley, and Little Marsh. The year's program will cost $141,562 and will up sendout by 2000 Mcf per day. Distribution extensions amount to 46,000 ft while 10,000 ft of transmission line will be laid.

North Shore Gas Co., Waukegan, Ill., will spend $700,000 this year—$530,000 for distribution; $140,000 for service building, automotive and construction equipment; and $30,000 for production. Seven miles of high pressure distribution lines will augment supply into the station and permit sale of dump gas load in the summer. Also included in the program is construction of 15 miles of new main and five miles of replacement main.

Ohio Fuel Gas Co., Columbus, has allocated $4,395,000 divided as follows: Production, $1,449,000 for additional underground storage facilities; transmission, $1,128,000, including 50 miles of line (market lines will cost $520,700 and expansion of facilities in connection with storage will take $510,000); distribution, $1,607,000 for 80 miles of line and extensions of distribution plant; general, $211,000 divided between autos ($70,000) and buildings ($90,000). Sendout will be increased by 32,000 Mcf per day with 163,000 Mcf for peak loads.

Oklahoma Budget

Oklahoma Natural Gas Co., Tulsa, reports a budget of $8,852,112 for the fiscal year Sept. 1, 1948, to Aug. 31, 1949. This year's expansion will be part of a 1948-53 program estimated to cost $32,690,000. Production (acquisition of leaseholds, drilling, etc.) will take $724,770 of the 1949 allotment; transmission (extensions of about 96 miles to new gas supplies, new business, compressor station additions, etc.) will cost $4,864,624; distribution (about 199 miles of mains) $2,169,089; and general, $1,093,629.

Pacific Gas & Electric Co., San Francisco, has allocated $57 million for new construction. This is part of a $116 million program scheduled for completion in 1952. The 1949 expenditure is to be divided like this: Production, $2 million; transmission, $21.6 million; distribution, $33.4 million. Six hundred miles of distribution mains and 185 miles of transmission line will be laid. Major projects are a 34-in. line from Topock to Milpitas, of which approximately 80 to 100 miles will be completed in 1949, a 17-MMcf holder in San Francisco and one in Richmond, and reinforcing of the system to make available additional fields in the company's service area. The 34-in. line from Topock to Milpitas will connect with the El Paso Natural Gas line from Texas and New Mexico, approved late in February by the FPC.

Pennsylvania Power & Light Co., Allentown, will change over two areas (about 1600 customers) from carburetted water gas to LP-air gas. The company's appropriation for the year is $792,300, of which $512,300 will be spent for revamping and replacing existing production facilities, and the remaining $280,000 will be divided between transmission and distribution. The projects are part of a 1948-50 program estimated to cost $1,942,700.

Peoples Gas Light & Coke Co., Chicago, will spend approximately $13.5 million for replacement of property and equipment, construction for a peak load supply of gas, completion of a new battery of coke ovens, and partial construction of a new gas holder.

Peoples Water & Gas Co., Miami Beach, Fla., plans to lay three or four miles of

distribution main and to install meters, regulators and services. All of the company's $111,710 appropriation will be expended for distribution facilities.

Philadelphia (Pa.) Electric Co.'s program for 1949 is part of a long-range plan instituted in 1947 and estimated to cost $27.5 million. This year $3,032,000 will be spent for distribution (63 miles of main), $2,063,000 for transmission (eight miles of line), and $1,850,000 for production—total: $6,945,000. Completion of the present expansion program will make available for sendout in 1953 an estimated additional 12,125 MMcf per year.

Portland (Ore.) Gas & Coke Co. has allocated $691,000 for 1949, $269,000 for production and $422,000 for distribution. Twelve miles of mains will be laid. No large-scale work is planned as the company in 1947-48 carried on very extensive construction programs which almost doubled the heavy oil capacity of its generating plant and increased the recovery and production of by-products.

Public Service Co. of Colorado, Denver, plans to spend $3,950,000 to expand distribution facilities to meet growth in its present service area. The project includes 100 miles of distribution mains.

Public Service Co. of North Carolina Inc., Gastonia, has allocated $100,000 for its 1949 expansion program.

New Coke Ovens

Public Service Electric & Gas Co., Newark, N.J., has allotted $16,785,000 as this year's part of a continuing expansion program which will allow a peak day capacity of 255 MMcf for the winter of 1949-50 and annual sales of 45,700 MMcf during 1950. Included in the estimated expenditure of $7,921,000 for production are the erection of a third battery of 37 coke ovens, new unloading dock, traveling coal unloading tower and conveyors. The new battery of coke ovens will increase daily coke-oven gas output from 14 to 20 MMcf. The $7,395,000 for distribution covers numerous projects for additions and/or improvements to buildings, mains, services, and meters. General expansion will cost $1,113,000 and $356,000 is earmarked for storage facilities.

Republic Light, Heat & Power Co. Inc., Buffalo, N.Y., this year will complete a $2,386,000 program started in 1947. The 1949 expenditures total $893,000—$461,000 for transmission (17 miles of line), $300,000 for distribution (nine miles of mains), $100,000 for general construction, and $32,000 for production and storage. Sendout of natural gas will be increased 7000 Mcf daily and of manufactured gas, 6000 Mcf per day.

Roanoke (Va.) Gas Co. has designated $49,850 for distribution improvements and $6000 for miscellaneous expansion. Total expenditure will be $55,850.

Rochester (N.Y.) Gas & Electric Corp. will spend $1.2 million for distribution and $800,000 for production facilities. This $2 million is part of a 1945-55 program estimated to cost $12 million. In 1949 15 miles of feeder mains and five miles of distribution mains will be built, and peak load sendout of mixed gas will be upped 12,000 Mcf per day.

San Diego (Calif.) Gas & Electric Co. will build 53 miles of transmission line and 12 miles of distribution feeder mains as part of this year's $5,875,000 program. Sendout for firm demands will be increased 40,000 Mcf daily, and peak load output of LP-Gases will be upped 1500 Mcf per hour. This program includes a 16-in. gas transmission line from Riverside county, taking off from the Texas-to-California line owned by Southern Counties and Southern California Gas Co.'s. San Diego's share of the cost will be $3.5 million. Also included is a 1 million gal LP-Gas standby plant costing $1.3 million.

Seattle (Wash.) Gas Co. plans to spend 62% of its $240,000 allocation for production facilities and 38% for distribution. Main extensions, services, meters, miscellaneous plant improvements, and removal of plant gas flow bottlenecks are to be included.

South Carolina Electric & Gas Co., Columbia, may increase the Btu content of its gas this year from 540 to 900-1000. Production projects — purification, condensing, and cooling facilities—will cost $112,907 and $260,000 will be spent on distribution, for a total allocation of $372,907.

South Carolina Power Co., Charleston, has allocated $116,791 for expansion projects, divided as follows: Production, $5014; transmission, $17,742; miscellaneous and transportation, $10,993; distribution, $83,042. Of the transmission and distribution allotments, $36,757 will be used to serve a new housing development in the Charleston area. About 12 miles of 3-in. equivalent line will be laid.

Southern Indiana Gas & Electric Co., Evansville, will spend $476,723 this year. Production expenditures of $321,223 are to cover the completion of a booster compressor and propane-air standby gas plant with capacity equivalent to 400 Mcf per hour of natural gas. Distribution projects, totaling $155,500, will include regular new business extensions and miscellaneous distribution system improvements.

Southern Natural Gas Co., Birmingham, Ala., has tentatively allocated $2.6 million for miscellaneous new construction. The principal project will be about 35 miles of 12-in. line paralleling existing branch lines.

Southern Union Gas Co., Dallas, plans to spend $89,765 for general construction, $669,000 for production, $1,814,622 for transmission, and $674,518 for distribution, making a total gas plant expenditure of $3,247,905. Water and sewer projects will cost an additional $9000. The 1949 construction is part of a 1947-51 program which is expected to cost $11 million. This year 97 miles of transmission line will be built and 65 miles of distribution mains. Sendout will be increased 15,000 Mcf by next fall.

Southwestern Public Service Co., Amarillo, expects to use most of the $270,243 allotted for 1949 in the expansion of the distribution systems in towns presently served. Approximately 25 miles of additional line will be laid.

Texas Public Service Co., Austin, will build 30 miles of mains during 1949. All of its $888,575 budget will be spent for distribution facilities.

In West Virginia

United Fuel Gas Co., Charleston, W. Va., has allocated $9.7 million for projects including construction of 19 miles of 8-, 10-, and 24-in. transmission and field lines and 58 miles of 2- to 8-in. distribution mains. A sizable amount will be used for well drilling and underground storage pools, as well as miscellaneous routine expenditures for all departments. The budget is to be divided as follows: Production, $6.5 million; transmission, $1.6 million; distribution, $1.1 million; general, $500,000.

Wisconsin Power & Light Co., Madison, will spend most of its $612,966 budget to build connections between its system and natural gas transmission lines. Nine communities will be changed over to natural gas in 1950. Six miles of line are included in the $28,400 assigned to transmission, five miles of main are part of the $529,216 to be used for distribution projects, and $55,350 will be spent for production. The work of 1949 does not make any new gas available but makes transition to natural gas possible in 1950. The following towns will be changed over: Fond du Lac, Berlin, Ripon, Beaver Dam, Waupun, Brandon, Janesville, Beloit, and Edgerton.

Worcester (Mass.) Gas Light Co. plans to increase its sendout 2800 Mcf per day by changing to 634-Btu gas, a higher Btu-value than that now served. The year's construction budget has been set at $376,500 with $155,000 for production, $180,500 for distribution, and $41,000 for other projects. Cooling and handling equipment will be increased to help raise production capacity.

York (Pa.) County Gas Co. has allocated $240,000 for 1949, divided as follows: Production, $10,000 and distribution, $230,000. Six miles of distribution mains will be laid. During the year the system will be partially changed over from manufactured to natural gas.

Miscellaneous Companies will spend a total of $68,993,590 for 1949 construction. These projects are parts of long-range programs estimated to cost $456,500,000 when completed. Breakdown of the expenditures is as follows: Production, $16,547,660; transmission, $11,365,000; distribution, $37,150,930; and general, $4 million. About 1795 miles of distribution lines will be laid and 110 miles of transmission line. Firm sendout of manufactured gas will be upped 47,600 Mcf per day and 4400 Mcf a day will be added to peak load supplies. An additional 8000 Mcf per day of LP-Gas will be available for peak load periods, and natural gas peak sendout will be raised by 120,000 Mcf daily. The programs will also provide an extra 130,000 Mcf a day of mixed gas.

LET'S TAKE STEPS

to stamp out unfair competitive practices

By C. GEORGE SEGELER

"Unethical advertising has reached a deplorable low."

UTILITY companies in general have been proud of the fact that the prices they charge for their services have increased so little through this time of rapid increase in the cost of living. To be sure, this has reduced gas company earnings in all too many cases to mighty thin levels but to balance that, improved efficiency in production, distribution, and management, and increased consumer use of utility services, have taken place. In two vital markets for gas companies—cooking and water heating—no increased use of gas per customer is discernible and it is this subject which I would like to explore.

The American Gas Assn. Subcommittee on Fuel Usage Factors has just completed a national study on residential gas sales trends exclusive of house heating. They found for the New England states that the present sales per domestic meter were generally a few per cent under the 1929 levels, except for certain cities. The over-all average was raised by their results to make the present regional index 101. When this is compared with the change in the residential electric index—287% of 1929—our first reaction is to view with alarm.

Closer analysis will show that the increase is due to more appliances per customer, not to greater use of single appliances. Applied to the gas business, this means concentration of effort on more gas-using appliances per existing customer; that is, a higher saturation of gas ranges, automatic water heaters, laundry dryers, incinerators, refrigerators, incidental space heaters in old houses, not merely in new construction. Yet, we are faced with strongest competition for this very market. Let us look at some factors that have caused this.

Presented at the annual meeting, New England Gas Assn., Boston, March 24-25.

If we turn to the U.S. Labor Statistics for the New England states, we learn that about three-fourths of the population lives in urban areas, presumably within reach of gas service. There are close to 7 million people whose income in 1940 amounted to $819 per capita. As you know, this amount has more than doubled and in 1947 the per capita income had risen to $1,650. While it is true that much of this increase has been syphoned off by increased taxes and very high living costs, there has been, according to Harvard's Sumner Schlicter, a net increase in purchasing power.

In 1940 the average annual utility bill for New England urban families was $31 for gas and $36 for electricity, or a total of $67. Taking the average size of the family at that time into account, the per capita total utility bill was $17.60 per year. Naturally this changed by 1947, since the use of gas and electricity had grown quite considerably. The 1947 annual gas bill was $40 per family and the electric bill was $43 per family, or a total of $83. Interpreting this in terms of the current family size, $20.80 becomes the individual's share of the utility bills. The increase in the annual per capita cost of utility services has been small, as these figures show. Since the income as well as purchasing power has grown, the effect has been to reduce the importance of utility expenses in the individual's budget. In 1940, 2.15% of the budget had to be set aside for gas and electricity but by 1947 the utility budget was only 1.25% of income.

The New England urban family incomes at more than twice pre-war levels are, therefore, much better able to pay for utility services and it is natural to assume that this change is influencing the buying attitude with respect to service such as cooking and water heating, whose total cost is so modest anyway.

In general, we may also say that the initial steps in the gas and electric rates in New England have remained practically unchanged in the period in question. Gas rates have started to rise and the trends observed by the EEI Rate Committees indicate that the electric industry has now also reached the bottom of its bargain prices and upward revisions are in order.

Some analysts have drawn attention to a number of electric situations in which load saturation is now so high that promotional efforts by the utility itself will not be very ambitious. This, however, takes no account of the dealer attitudes, and it is the electric appliance dealer rather than the electric utility who does the bulk of the equipment business. His success naturally reflects the saleability of the merchandise. From the gas industry viewpoint it obviously matters but little where the competitive pressure arises. Our job is to take steps now.

Down to Cases

Thus far we have considered the changing economic picture in broad terms; let's look at it specifically with respect to domestic cooking and water heating. The amount of electricity required for cooking by a typical family is in the neighborhood of 110 kwh per month and thus the monthly bill for electric cooking is scarcely likely to exceed $3. If they also can get along with slow recovery electric hot water service, another 350 kwh at about 1½ cents per kwh must be added. Let us say a total bill of $8.25 per month for electric cooking and water heating.

The corresponding gas quantities would be 1400 cu ft per month for cooking (530-Btu gas) and 2900 cu ft per month for water heating. However, the gas water heater has greater capacity and would be used to give adequate, not skimpy, hot water service, thus requiring a little more gas, say 3500 cu ft. The total gas consumption for cooking would, in most New Eng-

AGA's engineer of utilization think it's high time that everyone started selling his product on its own merit.

land cities, yield a gas bill lower than $8.25 per month. But, is this difference enough to keep our competition within bounds? Not unless we back up a cost advantage with sound promotion.

Today there are 33 well-known national electric range producers whose sales efforts will certainly be rewarded at least with some degree of success. This is about the same number as before the war, although there have been company changes. As for gas range manufacturers, there were 65 as late as 1942 but now there are 54 manufacturers of approved ranges and two making dual coal and gas equipment only. The electric and gas range sales data provided by the Statistical Department of GAMA is receiving the careful and widespread study that it deserves. We see that in the prewar period approximately four gas ranges were sold for every electric range; whereas the 1948 estimate was around 2 to 1.

Many of the same arguments can be projected for water heating, and the data show a phenomenal growth in electric water heater sales in the last two years.

These facts seem to be legitimate competitive situations which we must plan to combat. There is, however, a need for taking some steps to correct illegitimate and unfair competition which has been very damaging and which paves the way for mighty serious developments. A flood of publicity and irresponsible claims for electric performance is found in advertisements, promotion pieces, and newspaper and magazine publicity releases. Let's look at a few of these and let's take some steps to stop this sort of thing.

The competition is circulating a promotional booklet that is full of misleading and untruthful statements. The two most unwarranted claims relate to meat shrinkage and to relative efficiency. The claim that meat shrinkage is less with electricity is completely false, as established by every responsible agency that has studied the problem, including the Bureau of Standards, the National Live Stock and Meat Board and many packers, the Universities of Nebraska, Missouri, Chicago, and others. The claim is a complete phoney and some means should be employed to inform the public of this fact. It is an example of thoroughly illegitimate advertising and we are constantly surprised that responsible executives of such important manufacturers permit this type of publicity.

The second claim, relating to thermal efficiency, is much more subtle and correspondingly difficult to combat. It is self-evident that some heat will always be carried away in the flue products of gas equipment. Consequently, it will take that many additional Btu's when gas is used to do a job compared to the amount required when electricity is used. This naturally tempts our competitors to quote figures showing how many times more efficient electric equipment is than gas. We don't like to quote such figures since it is manifestly poor selling to come out and state that your competition is more efficient than you are. Therefore, we are caught in a dilemma mainly because the electric claims are exaggerated.

Baloney

Authoritative data are now at hand. Competent field studies recently conducted by several large combination gas and electric companies showed that 13 cu ft of 525-Btu gas equaled 1 kwh for cooking. Our laboratory tests, nearing completion, confirm this figure. Yet, the baloney pours out as much as ever. Laurence Wray (Electrical Sales Handbook published by McGraw-Hill Book Co., New York—1948) says, "the old 1935 AGA tests show that the energy ratio was 2.077 but, etc., etc." He winds up by saying, "I say it is really 3 to 1." He reaches this figure by dragging in a famous . . . "test at a Midwestern university under government supervision (which) proved that electric equipment is 2.68 times as efficient as gas." This ancient test is indiscriminately used in many electric appliance advertisements in current magazines to compare domestic ranges or, when convenient, commercial kitchens involving a miscellaneous set of appliances. Actually, this test was performed at Purdue in 1935 on certain domestic electric and gas ranges in which the cooking methods were those found in the cookbooks supplied by respective manufacturers.

No attempt was made to be sure that the same cooking method was used on both gas and electric equipment. Thus, we find in this test a recipe for preparing chocolate pudding which says, "Electric range, small unit—High setting to scald milk; Pour over other ingredients; Low 10 minutes; Off 10 minutes and serve. Gas range—Add ¾ qt of water to the bottom of a double boiler; High flame to boil water; Put milk into top of double boiler and turn gas flame low until milk is scalded. Pour over other ingredients. Cook over low flame 50 minutes. Turn out flame and let stand three minutes longer."

On the matter of meat shrinkage, a good example of misleading advertising can be found in a series of commercial cooking ads which come down to cases and show the alleged dollars saved per month in meat shrinkage resulting from the use of electric cooking rather than gas. In one case the cafeteria described in the ad as being such a booster for electric equipment has just installed a new bake shop with two more large gas-fired rotary ovens to add to the electric equipment they already have. In fact, this widely advertised job has only one electric roast oven, a three-deck unit. Their alleged tests show about a 10% saving in meat shrinkage and they say this equals $804 per month. I figure that means they must have had a normal shrinkage before they put in this electric oven of $8000 worth of meat a month. Just in general, meat shrinks about one-fifth during roasting and if that is acceptable, it would mean that this one oven was cooking about $40,000 worth of meat per month. The ads give some more data which make it quite easy to calculate that this one three-deck conventional size bake oven was turning out 487,272 servings of meat per month. That is quite a production record!

In spite of all the work that has already been done on meat shrinkage, it looks as though nothing short of a public test with wide publicity will put an end to unfair claims. All this prompts me to a suggestion which would save both the gas and electric industries quite a bit of money. It has been my lot to take part in innumerable battles over how much electricity equals how much gas and whether or not meat shrinkage is a valid argument. In many instances, particularly in negotiating with the government agencies, hearings are held, proofs are demanded, and both the gas industry and the electric industry are forced to spend substantial sums to prove, not the merits of their respective services, but the validity of yardsticks by which they may be measured. It seems high time to me that we stop this waste of money and agree mutually on the method of measuring performance, and then proceed to sell our respective products on their own merits and not by casting aspersions on our competitor.

A page from a new promotional booklet for electric cooking shows candles smudging a glass. The implication that gas acts like that is clear. It is a typical electrical appliance manufacturer's attack on us. I know that you regard such statements that soot and smoke are common by-products of gas use as objectionable advertising because they are not true. Let me show

you another advertisement in a different vein. "Clean heat. A gas flame burns clean. Thousands of steaks and chops are broiled every day under open gas flames — and mighty good they taste. There's no smell or smoke from the gas flame, either. If there were, you couldn't burn four burners at once on a gas range. This is clean heat if there ever was clean heat." Now for a surprise. These two opposing statements are from promotion material issued by one manufacturer. Guess who?

The sum total of this picture is that unethical advertising, or perhaps management control of promotional tactics, have reached a deplorable low when so much time and money are spent on insidious comparisons of another's product.

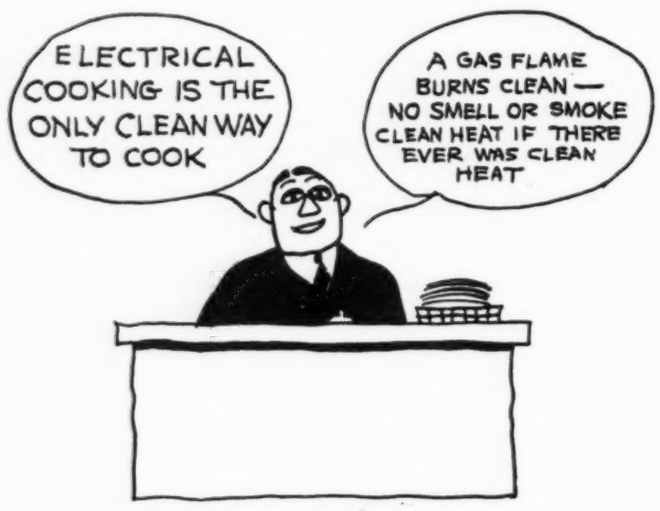
Here are two frequently heard statements that seem to be in opposition to each other: First, consumer surveys show that housewives favor electric equipment, and second, that we know gas appliances are as good or even better. Could it be our own fault, since to a large degree we have permitted and still permit such large numbers of relatively poor quality gas appliances to get into the homes? We know exactly how this happens. Landlords owning apartment houses or other rentable quarters provide the bare minimum; most building for low and middle income groups is done by speculative builders who must watch every penny and who, therefore, buy on a price and not on a quality basis. The nature of gas appliances is such that they can be produced to meet a price. Small wonder, then, that homemakers using such equipment do not become enthusiastic over gas.

Housing at Fault

In the town where I live the situation is particularly bad in spite of the almost complete absence of electric range competition. Many apartment houses have tiny kitchens. There isn't a housewife in a hundred who will roast or bake with gas on a summer day in such places—and why? Simply because there isn't a properly insulated gas range in the lot—and as for mechanical kitchen ventilation, it just has not been adopted. Now this is not the fault of the utility companies. They are almost powerless in the matter because *price* is the determining factor. Maybe homemakers themselves could be shown how to make the kitchen a better workshop and thus learn to insist on quality installations, but this will be a tough job as long as housing is so scarce that any old place is gobbled up as soon as it is vacant.

Electric ranges emit Btu's into the kitchen too, just like gas ranges. but by reason of heavy insulation they don't do it quite as fast and so the heating effects

"DOUBLETALK"


ELECTRICAL COOKING IS THE ONLY CLEAN WAY TO COOK
A GAS FLAME BURNS CLEAN — NO SMELL OR SMOKE CLEAN HEAT IF THERE EVER WAS CLEAN HEAT

Contradicting claims were made in promotion distributed by one manufacturer.

are stretched out over a longer period of time. Now, we have gas ranges that will do just as good a job. They are just as automatic and if the kitchens were designed with good venting to carry off odors, steam, grease, and heat, it would put an end to the kind of answers consumer surveys hand us now. The first point, then, in a permanent program of sound gas promotion rests squarely in our laps. I grant that it is a very tough job to solve this problem but that very difficulty makes it all the more imperative to do something about it if we intend to survive in the cooking market. Satisfied customers who like to use their gas appliances even in summer close the door to high priced competition.

Information at hand indicates that in spite of considerable growth in the total number of domestic meters in the New England states, the total gas sales personnel is somewhat smaller than it was before the war with fewer meters. Results from six major New England companies indicate that there are one-third less gas salesmen now. Furthermore, eight years have been added to the ages of all too many of the older men and while this may have increased their experience, it does have a tiny effect on their zeal. In the meantime, there has been a change in the electric sales personnel of an entirely different order. This situation makes it increasingly difficult to insure the activities of our own dealer sales allies. A sound program for the future, so it seems to me, would require a back-up of sales allies with sales efforts, promotion, and advertising. at an increasingly higher level.

These are unpleasant facts but they must somehow be met in view of the already changed picture reflected by the ratio of gas and electric range sales. We are now on the defensive but must resume a forward march with greatly expanded efforts. It takes money to do that—which also suggests that quality appliances be given a greater play because of the inherently higher profit margin that better appliances encourage.

A sound sales program also means that our installation practices should be given a going over. As far as gas ranges go, the methods of handling them are of such long standing that they may be ready for a re-examination to lower cost. Every possible method of reducing expense should be carefully reviewed to see if it could be adopted to advantage even in the face of previous doubts.

With new houses much needs to be done to offset mounting costs of plumbing which generally apply to gas piping also. Contrariwise, there is a feeling that incremental cost of three-wire, 220-volt service outlets is low enough to justify installation—just in case.

Codes Revision

As for heating equipment, a fine start has been made in the proposal to publish a set of minimum acceptable practices now being carried out by an AGA committee headed by H. P. Morehouse of the Public Service Electric & Gas Co. of New Jersey. In this field the competitive aspects are not so severe and yet there we take the proper and most comprehensive steps to assure customer satisfaction, while on the battleground of gas and electric ranges we are doing so little along these lines. Even now there are but few cities that have modern gas sections in their building codes. requiring at least the use of approved appliances. New wordings for codes are available which make this possible where gas companies feel such a provision desirable without involving complex procedures. Adequate codes protect consumer health and safety through increasing satisfaction obtained from gas equipment. You can obtain this information by writing to us at AGA.

There is great need for revision of antiquated requirements and there is need for the inclusion of stricter controls to prevent unsatisfactory installations. Though not too important in New England, the unvented space heater in bedrooms, prevalent in many parts of the country, is an example of a needed control.

In a sense this has been a negative plea in that I am asking for fair treatment, for that won't sell gas in today's competitive market. A sound overall plan is in order to change the pattern which competitive sales efforts have been printing on the record in the last few years. We hear talk about surveys that reveal community attitudes toward the modernity and desirability of certain electric equipment. We in the gas industry know that modern high-grade gas appliances can do an equally effective job for the housewife.

Pre-Testing New Ranges Reduces Service Calls

PRE-TESTING new gas ranges on a test rack designed by personnel of Lone Star Gas Co.'s Dallas division has reduced both service calls and range delivery and installation time for the Dallas branch of Sears Roebuck & Co. Ranges are tested in Sears' warehouse, according to M. A. Caspari, pool stock manager.

H. M. Bradford, Lone Star dealer assistance representative in Dallas, recommended the test rack some time ago as a means of cutting down service calls and of creating greater customer satisfaction with new ranges being installed for Sears customers in the Dallas area.

The idea was accepted and Mr. Bradford worked closely with their plumber in planning the unit. With the assistance of J. A. Hayes, Dallas Division shop superintendent, and Glen Moulden, assistant to Mr. Bradford, the three Lone Star men drew up plans and a design for the rack. Mr. Moulden supervised building of the rack which was completed and put into use the latter part of December.

Mr. Moulden also assisted in training Sears personnel in the use of the installation.

Range tests require less than 30 min per range and some 30 a day can be handled on the new rack which was installed as a section so that additional sections may be included as they are needed.

The rack is served through an individual meter at the warehouse so that gas consumption on range testing could be checked separately. An Emco flow meter No. 50 is installed on the meter rack to check individual burner consumption and Sears also installed 150 ft of new service line as part of the rack installation. The rack handles two ranges at a time.

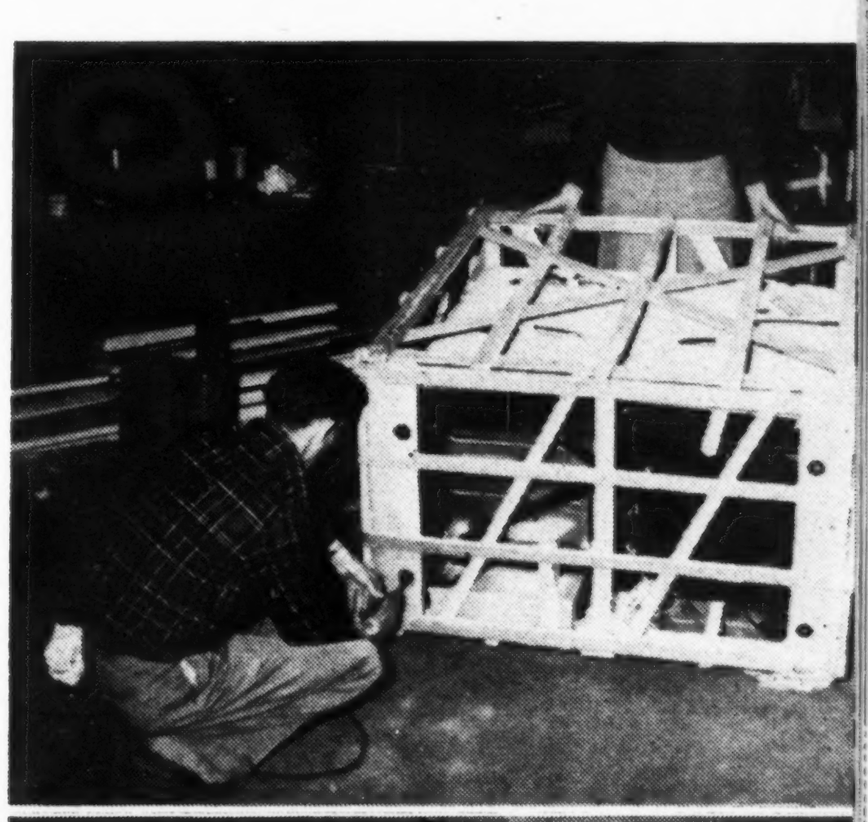
"It has paid for itself," Mr. Caspari stated, "by saving on service calls and delivery time and by showing up defective parts which might be overlooked at the factory. Formerly, the ranges were tested in the customer's kitchen following installation. This meant working in close quarters and the possibility of overlooking minor defects. On the test rack, checking can be more complete and the ranges are easily maneuverable because they are handled on specially built, individual dollies."

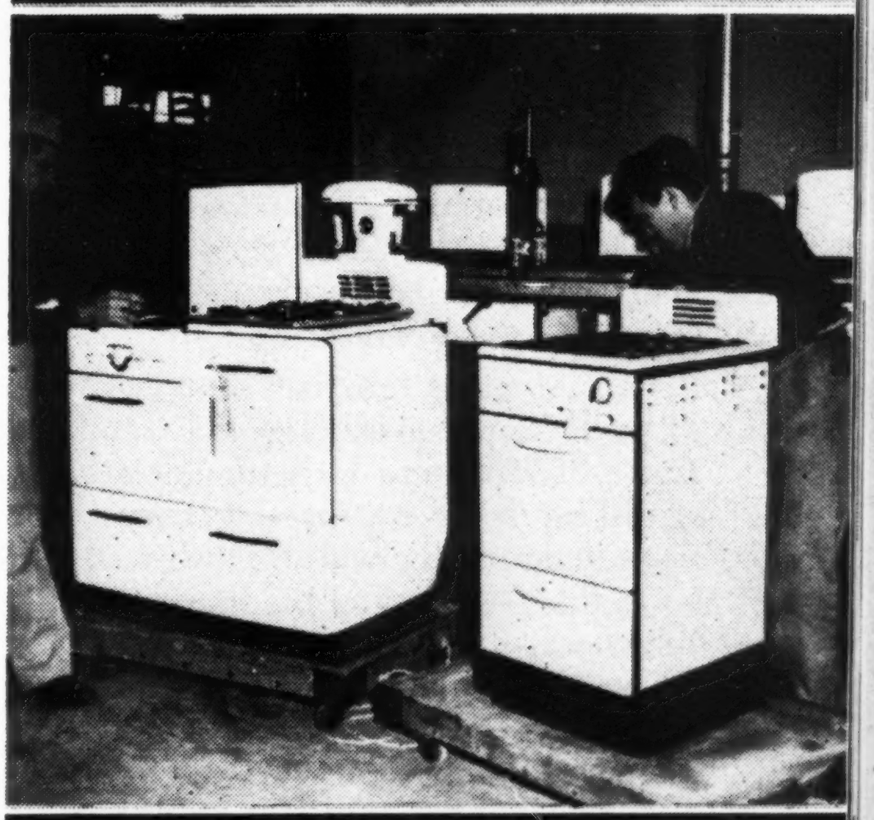
The term "deluxing" is applied to this pre-testing by Sears employees. It is used generally as a term applied to checking other home appliances and furniture before it leaves the warehouse.

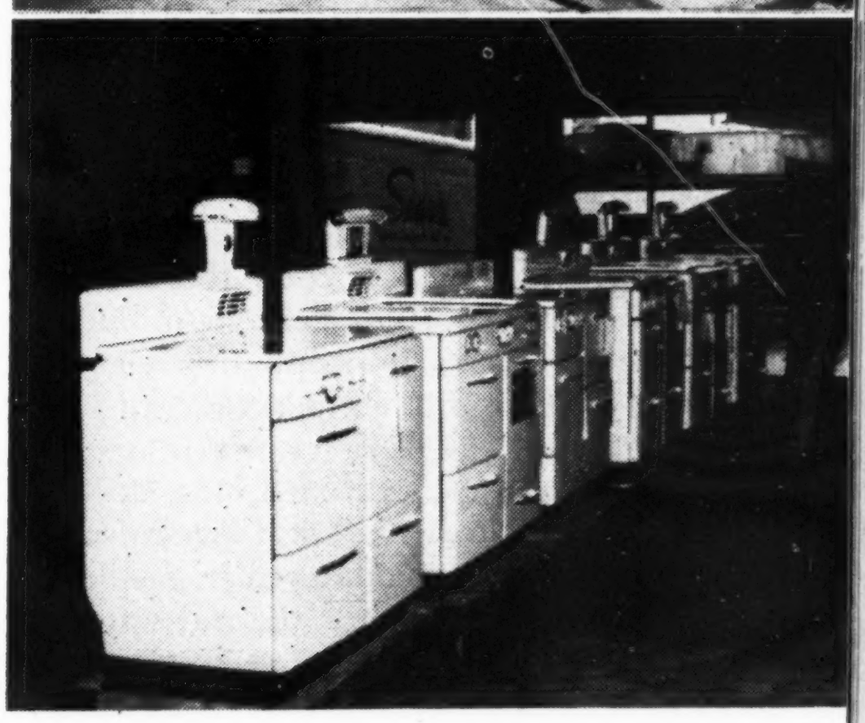
Ranges arrive in carload lots, follow an assembly line procedure through the warehouse. After it is uncrated, a range is placed on the dolly, inspected for damage or defects and moved into line behind other ranges on the test rack. Then an inspection and history card which remains in the central service department as a permanent record of service calls, is attached and the range is pulled into line in the delivery area. Still riding on dollies, the ranges are pulled into waiting delivery vans, padded and strapped to avoid any future damage enroute to the customer's home.

That pre-testing is another forward step by this company in its program of better customer service and satisfaction, is proved by results in the first few weeks of its use. Defective manifold castings were discovered in two ranges on the test rack, which would not have been noted otherwise until they were installed in the customers' homes. The defective parts would have meant delay in putting the ranges into service and a return to the warehouse for replacement parts.

Sears Dallas branch contemplates future use of the test rack for gas automatic water heaters and other gas appliances before delivery in their area which comprises a 40-mile radius of Dallas.

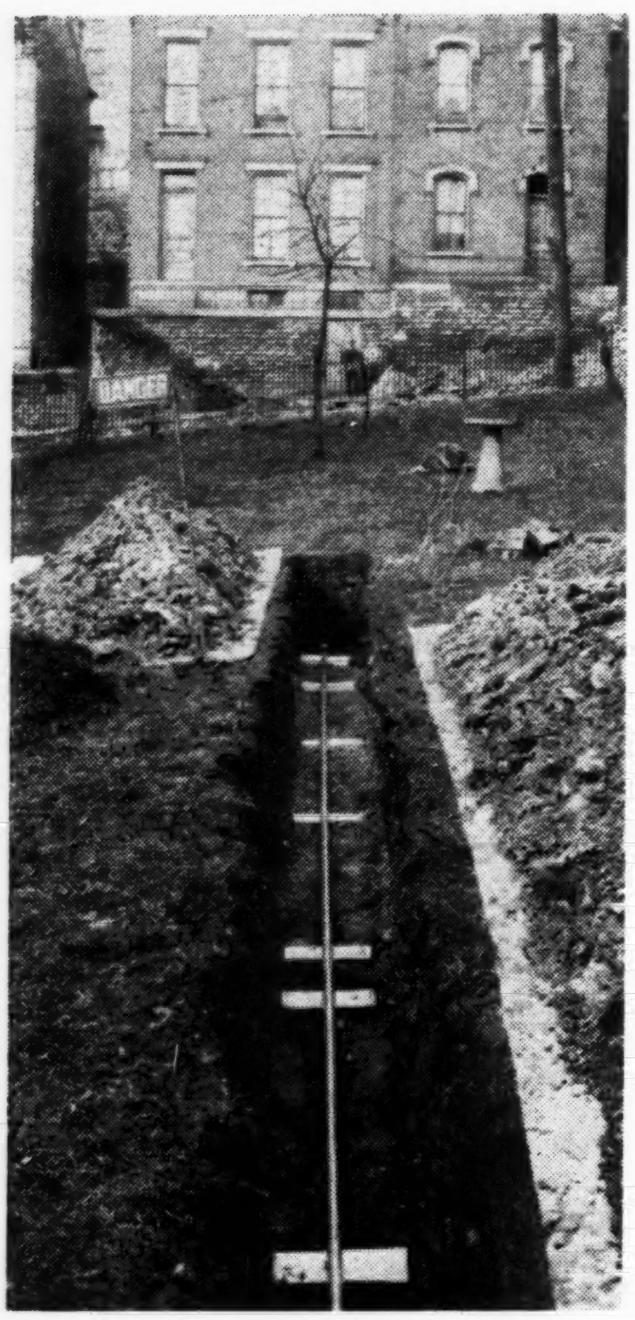






From top to bottom, the assembly line technique calls for (1) uncrating and placing the ranges on dollies, (2) inspecting for surface damage or missing exterior parts, (3) testing, and (4) forwarding to company delivery area.

Reprinted from the February 1949 issue of Lone Star Gas Co.'s house organ, *The Blue Blaze*.



Experiences With Copper Tube In Gas Services and Mains

By T. E. VELTFORT

Fig. 1. Copper tube inserted into existing corroded steel pipe, eliminating opening of pavement of street between fence and far curb line. (Cincinnati Gas & Electric Co.)

THE replacement of gas service lines has been a vexing and costly operation, particularly where soil conditions are such as to make the necessity for replacement fairly frequent. A solution to some of the problems involved has been found by many gas companies through the use of copper water tube.

Exclusive

Copper water tube is a seamless tube of pure copper available in a complete range of sizes and wall thicknesses. It is distinguished by three type designations denoting the wall thickness. Type K is the series with the greatest wall thickness. Type L is the medium series of wall thicknesses and like Type K, is available in straight lengths of hard temper tube and in coils of soft or annealed temper tube. Type M, available only in hard temper and in sizes larger than are generally used for gas services, is the thinnest series.

All three series or types have the same outside diameters, the standard being 1/8 in. larger than the nominal size. For example, the mean outside diameter of 5/8 in. copper water tube is always 3/4 in., subject to very close tolerances. All three types of copper water tube have a safe working strength far greater than will be developed by any pressures encountered in gas distribution; consequently the selection of the proper wall thickness is generally based on the required resistance to soil corrosion and to mechanical damage.

Obviously, the greater the wall thickness, the longer the tube will withstand failure due to corrosion. As will be shown later, copper in gas service is showing evidence of extremely long life and offers very good resistance to soil corrosion. Also, when copper water tube is installed inside old ferrous services where galvanic corrosion may be expected, the copper, being anodic to the iron, is not affected and the galvanic corrosion manifests itself on the disused ferrous pipe, where no harm will result. Recorded examples of long life of copper tube services under adverse soil conditions will be discussed later. The indications are that copper tube used for gas services, notwithstanding of course, mechanical damage, should last practically indefinitely.

Reports of mechanical damage to copper tube are infrequent. Such damage occurs only by accident and even then involves the coincidence of several circumstances. Increasing the wall thickness of the tube decreases the risk of serious accidental damage.

Savings

Where service replacements are made by drawing soft tube (supplied in 60-ft coils) through existing services, notable savings in installation time and labor are achieved. Depending on the particular setup, similar, if perhaps not quite so large, savings are had by using hard temper tube and inserting it into the service being replaced. In either method, the advantage of very small street openings and eliminations of trenches is substantial.

In addition to the saving resulting from the elimination of most of the excavation and backfill, there are the benefits of improved public relations and the customer satisfaction because pavements and lawns need not be disturbed. These advantages of copper water tube for replacement of gas services are manifest and no apparent disadvantages have so far come to light. For similar reasons, some experienced utilities are using copper tube for new services and small mains.

Considerable experience has already been obtained from the use of copper tube with various types of gas. There is every indication that the use of copper tube with natural gas or with a mixture of natural gas and manufactured gas results in complete satisfaction. Opinions appear to differ on its use with straight manufactured gas, yet here also copper appears to give satisfactory service. Consider the experience of the Consolidated Gas, Electric Light and Power Co. of Baltimore, Md. Here steel service lines failed in time because of corrosion. These lines became lined with the products of corrosion which were impregnated with sulfur compounds bonded with gummy coal-tar residues.

When the copper tube was inserted into these pipes and was in contact

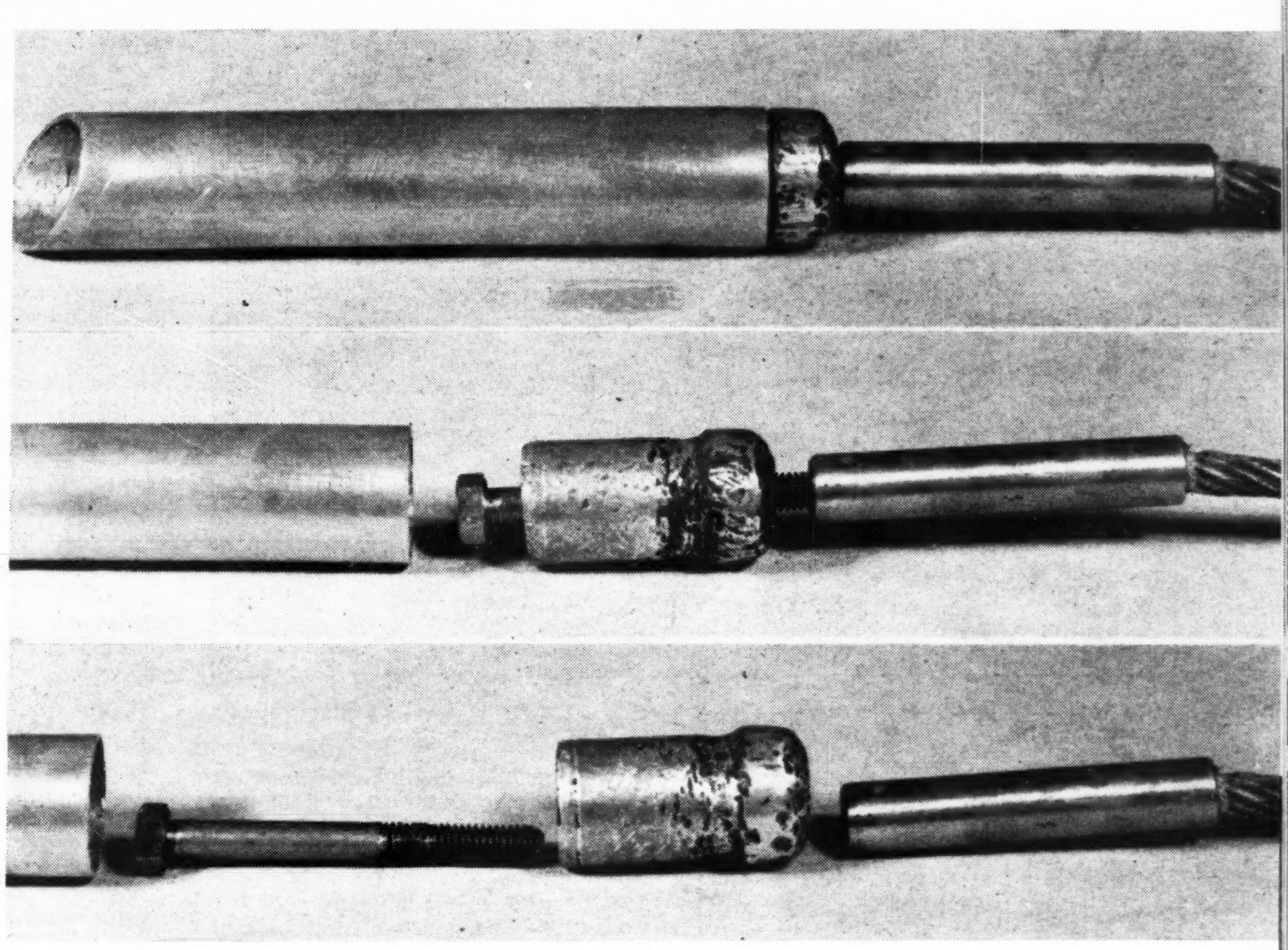


Fig. 2. Assembly of device for pulling soft copper tube into existing pipe. In top photo, plug is shown temporarily soldered into copper tube. Center and lower photos show the stages in assembly.

with the residue, it was feared that there would be a corrosive attack on the copper. The first 500 or so copper services were of bare copper; then the company started using tube with a 0.001 in. tin coating. This continued until the war when because of the restrictions on tin, bare copper was used.

Since the war the company has been using both bare copper and tin-coated copper as available, with the preference for the tin-coated. It has had no trouble with the bare copper and the company's research department has reported that the bare copper should have a 75-year life expectancy, but the operating personnel regard the extra few cents a foot for tin coating as good insurance. Tin-coating the inside of the tube provides protection from possible attack by gases containing high residual sulfur.

Installation Methods

Fears are sometimes expressed that small particles, the products of corrosion, even though minute and unimportant because of the low rate of corrosion, may be carried by the gas and deposited on small valve seats, pilot lights and the like, interfering with their operations. Reports indicate that this is much more infrequent than was anticipated; yet caution should be observed if the sulfur content is high.

Methods of installation vary, and each has its followers, who are apparently equally successful. For new installations of service lines and for small mains, hard temper copper tube is generally used. With hard temper tube, the desired rigidity is obtained, and it is easy to maintain gradients and eliminate pockets. When copper tube is used to replace existing pipe, both hard and soft tube are used with satisfactory results. With hard tube, the tube may be pushed into the line from the cellar end, or if done from the outside, a trench long enough to take a length of tube must be dug. *(Fig. 1)*.

Joints are made at the point of entry as the tube is pushed in. The resulting line offers the same rigidity as does the original installation. Using soft tube in coils, intermediate joints are eliminated entirely. A 1-ft square hole is amply large for this operation. A cable is snaked through the existing pipe, fastened to the end of the tube and then used to pull the tube through the pipe. A device for fastening the cable to the tube by temporary soldering is shown in *Fig. 2*.

Joints are made in a number of ways. Ordinary water tube solder-type fittings are quite successful. These are made up with 40-60 or 50-50 solder. A few localities prefer 95-5 (tin-antimony) solder, but this is difficult to obtain and its advantages are not apparent. The special Dresser fittings made for gas service are used by practically all installers for the particular use for which they are intended. Among these, and one of the most important, is one designed for use where the function of joining two units is combined with the function of electrically insulating one section from the other. Some use Dresser fittings only for the special applications, others use them throughout. They are easy to install and offer an appreciable amount of resistance to vibration. Several companies design their own connections and fittings.

Sealing Fitting

Fig. 3 shows a specially designed fitting for sealing the end of the existing steel service pipe where it enters the house cellar. It also shows the method of electrically insulating the line both at the main and in the cellar, using Dresser street ells with Bakelite insulating adaptors. A Dresser coupling, shown in *Fig. 4*, serves to seal the end of the existing service line, support the end of the new copper tube service, and provides for the connection for the piping from the service to the meter. *Fig. 5* shows a specially designed coupling that offers the advantage of not exceeding the outside diameter of the tube. Thus a 1¼-in. tube (1½-in. OD) may be drawn through 1½-in. ips pipe (1.600 ID). Flare-type compression fittings, used quite successfully for copper water service lines, have not found favor for gas distribution lines. Although there is no apparent reason why they should not be satisfactory, the fact remains that, for one reason or another, they are only rarely used.

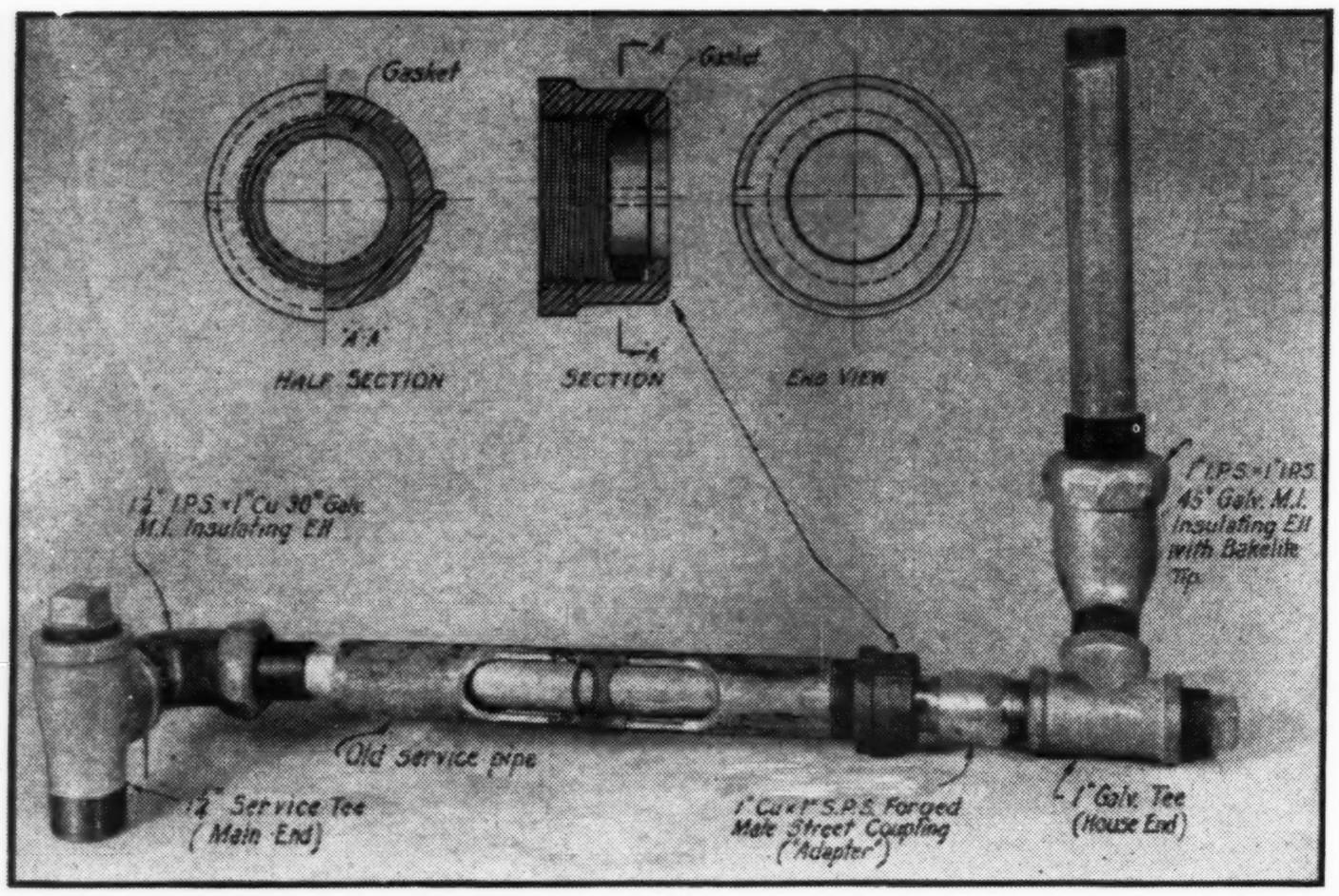

Gasket
A
A
HALF SECTION
SECTION
END VIEW
1" I.P.S. x 1" I.P.S. 45° Galv. M.I. Insulating Ell with Bakelite Tip
1½" I.P.S. x 1" Cu 30° Galv. M.I. Insulating Ell
Old service pipe
1½" Service Tee (Main End)
1" Cu x 1" S.P.S. Forged Male Street Coupling ("Adapter")
1" Galv. Tee (House End)

Fig. 3 (Above). General layout of finished service line, showing insulation of the line at the main and cellar wall, and a special fitting for sealing the existing service line.

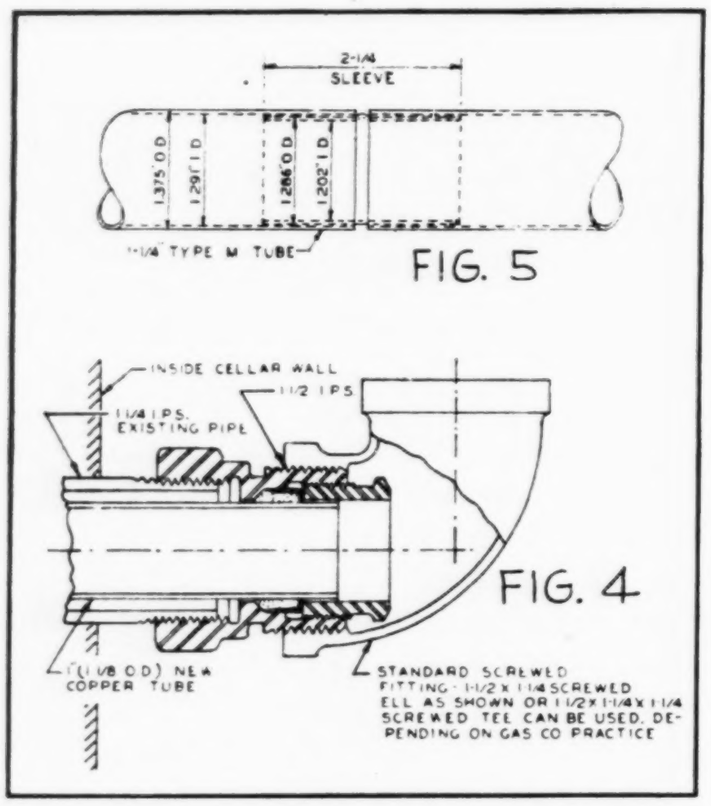

2-1/4
SLEEVE
1.375 O.D.
1.291 I.D.
1.266 O.D.
1.202 I.D.
1-1/4 TYPE M TUBE
FIG. 5
INSIDE CELLAR WALL
1-1/2 I.P.S.
1-1/4 I.P.S. EXISTING PIPE
FIG. 4
1-1/8 O.D. NEW COPPER TUBE
STANDARD SCREWED FITTING - 1-1/2 x 1-1/4 SCREWED ELL AS SHOWN OR 1-1/2 x 1-1/4 x 1-1/4 SCREWED TEE CAN BE USED, DEPENDING ON GAS CO PRACTICE

Fig. 4. Dresser fitting for sealing the end of existing service line and providing a connection for the new copper service line at the cellar wall.

Fig. 5. Use of an internal sleeve coupling does not increase the outside diameter; standard procedure of the People's Gas, Light and Coke Co. of Chicago.

Possibly the earliest recorded use of copper tube for gas services was in Nairn, England. In a report by John Barker, engineer and manager, Nairn Gas Light Co. Ltd., it is stated that the first installations were made in March, 1927, and after a 10-month observation period, copper proved satisfactory and has been used exclusively since, both for new services and for replacements. Joints are made with a flare-type compression fitting. Mr. Barker reports the following advantages for copper service lines:

"Freedom from trouble due to stoppages caused by internal corrosion of iron and steel service pipes.

"Longer life, as many steel and iron services have to be relaid in a shorter period than eight years owing to internal and external corrosion.

"The loss of pressure due to a frictional resistance to flow is much less with a copper installation than with an iron or steel installation, due to the fact that copper tubes have, and maintain, a much smoother inside surface, in conjunction with the fact that copper tubes can be bent and the use of elbows and bends is avoided, thus maintaining a smooth streamline flow through the pipeline.

"Meters last longer as they are free from dust."

Copper tube for gas services was first used in the United States later in 1927 in the city of Richmond, Va. Except during the war years when copper was unobtainable for the purpose, copper tube has been used almost exclusively for both new installations and replacements of services. The gas served in Richmond is a manufactured gas of low residual sulfur. Difficulty has been reported in some sections due to clogging of pilots, but this has not been regarded as of sufficient importance to outweigh other considerations.

Services are of Type K copper tube, hard temper, in straight lengths. Joints are of ordinary fittings, using soft solder. Wherever possible, bends are made by bending the tube rather than using elbows. Connection to the main is by means of a bronze tapping tee and a copper street ell. Gradients are carefully maintained so that any condensate will flow back into the mains and thence to gas drips.

In 21 years of experience with copper tube and soft soldered joints, there has been no reported failure. *(Fig. 6)*.

The Cincinnati Gas & Electric Co. began using copper for replacement of gas services about 1930. The majority of the soil in Cincinnati is of a definitely corrosive type, with a pH varying from 6.2 to 8. In this soil, unprotected steel pipe and malleable fittings are rapidly attacked, complete failure having been reported in as little as six months. Generally failures occurred in from 3 to 12 years, and the average of all recorded failures is 10.92 years. Although the complete destruction of unprotected steel pipe in some instances resembled electrolytic corrosion, investigation showed no trace of stray currents. The company is satisfied that it is not electrolytic corrosion, particularly as it does not manifest itself on copper tube.

CG&E has made some accelerated corrosion tests that show a 100-year life expectancy for copper tube as compared with one year for unprotected steel.

Since the first installation of copper services, there has not been a single reported corrosion failure of copper tube. (There have been a few instances of mechanical failure due to damage from picks, probe bars, etc., and a very few cases of crushing failures, but these are regarded as minor troubles.)

Card Records

Records of service installations are kept in a card file. A typical example is the record for 2254 Columbia Ave. Steel service was installed in 1930, replaced with steel in 1933 because of corrosion, and replaced again for the same reason with copper tube in 1935. Since then there has been no further difficulty. *(Figs. 7 and 8)*.

During the past 18 years over 700,000 ft of 1¼-in. and 2-in. copper tube have been installed, representing over 6000 replacements of steel services, over 28,000 new services and a few small mains. The tube used is hard drawn Type M copper water tube, specially annealed. Joints to the main are generally made in the conventional manner, some recent installations being by means of a saddle fitting brazed to the main. Most joints are standard copper water fittings joined by soft solder. For joints where soldering is not practical, compression type fittings are used. The copper tube is being installed in 2-in. and 1¼-in. sizes. Previously 1½-in. steel was the minimum but 1¼-in. copper appears to be entirely satisfactory and offers the distinct advantage of being able to go through a 1½-in.

ABOUT THE AUTHOR

MR. VELTFORT is manager of the Copper & Brass Research Assn., New York City. He was born in New York and received his B.S and C.E. degrees at New York University. Through extensive courses in various schools he specialized in the fields of accounting, industrial engineering and business administration. During World War I Mr. Veltfort was associated with the engineering firm of Stone & Webster. He was assigned to assist in the construction of the Hog Island ship yard near Philadelphia.

T. E. Veltfort

When the Copper and Brass Mill Products Assn. was formed in July, 1933, Mr. Veltfort was made manager of that organization. The Copper & Brass Research Assn. was formed in June, 1921. It had as its principal function increasing the uses of copper and copper-base alloys through technical and commercial research, public relations, publicity and other kindred activities. At a joint meeting of the two associations held at Hot Springs, Va., in April, 1940, they were combined under the name of the Copper & Brass Research Assn. and Mr. Veltfort was named manager.

Mr. Veltfort is a member of the American Society of Civil Engineering, New England Water Works Assn., Western Plumbing Officials Assn., American Ordnance Assn., a fellow of The British Institute of Metals, Sales Executive Club, and is president of the American Trade Assn. Executives.

steel pipe in replacement. Consideration is being given to 1-in. services for insertion through 1¼-in. steel pipe.

Renewal installation is generally accomplished by pushing the copper tube through the existing pipe, soldering each joint as it comes up to the point of entry. Cost of copper tube installed by this method is said to be practically the same as if steel pipe were installed in an open trench.

Anticipated trouble with the possible formation of copper sulfide and the attendant fouling of controls and pilots has not materialized.

Baltimore Procedure

In Baltimore, Md., the Consolidated Gas, Electric Light & Power Co. has replaced approximately 29,000 services with copper since 1939. Considerable savings in installation have been obtained: copper tube services require about 16 to 18 man-hours per service as against about 50 man-hours for steel pipe. Soft temper Type L copper tube is used in 75-ft coils, this length practically eliminating waste. The typical installation has already been shown in *Fig. 3.* The following detailed "General Procedure for Installation of Copper Services" is a good example of a successful technique:

"After the excavation (1 ft x 1 ft opening) has been made over the service connection at the main, the gas is turned off at the meter, the plug is removed from the tee in the main, and an expanding rubber plug is inserted in the tee to shut off the gas flow. The steel service is cut off near the main, the service tee and ell are removed, and the main tap is plugged with a threaded plug. Special tools are used for this work in a 1 ft x 1 ft hole.

"The inside piping leading from the service to the meter is disconnected and the old service is cleaned of rust or other stoppages by means of the special cleaning tools (scrapers). The scrapers ("A", "B", or "C"), attached to sections of ⅜-in. pipe (provided in 2, 5 and 10-ft lengths for convenience) are driven through the old service pipe with the steel driving head.

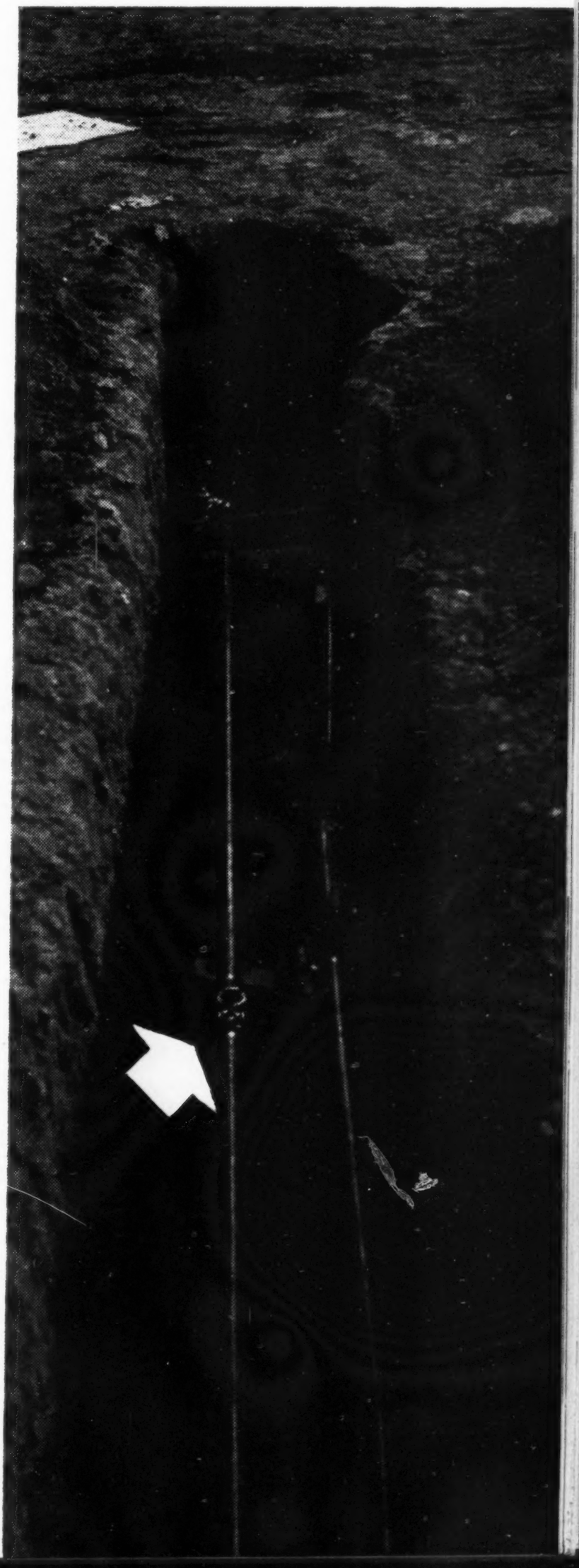
"The ends of each rod section are provided with steel driving pins, which butt against one another within the special coupling and absorb the shock that otherwise would be transmitted to the pipe threads. One of the special couplings must always be used to guide the driving head, the center pin of which transmits the energy from the hammer head (4-lb) to the driving pin in the cellar end of this last cleaning rod section. In the relatively few cases where these scraping tools do not remove the stoppage, the special reamer or twist drill cleaner is employed.

"The reamers or drills are forced through the service by means of a No. 1 lag wrench or a Dresser leak clamp ratchet wrench, which is attached to the rods by means of the split clamp adapter. A 5/16-in. flexible plow-steel cable is then fish-taped through the old piping, being drawn from the street into the cellar. A lug *(Fig. 2)* on the end of the cable is sweated into the copper tubing, the end of which has been shaped with a ¾-in. or 1-in. standard tubing shaping tool. The street end of the cable is attached to a hand-operated winch, which pulls the copper through from the house to the street. A new galvanized service tee is installed at the main, a Dresser insulating ell having previously been screwed into the side outlet of the service tee. About 2 in. of the copper tubing on the street end is cut off, thus detaching the lug and the cable. (This short piece of tubing is removed from the lug by heating).

"It was early decided that, inasmuch as the relatively thin-walled copper tubing would be subject to more rapid electrolysis destruction, it should be fully protected from such type of corrosion by being electrically insulated from stray current at both ends—the house end from current riding in on the water service and passing over to the gas service through the water heater.

"The final street connection is next made between the copper tubing and the insulating ell by entering the tubing into the ell and tightening the follower nut. These Dresser insulating ells have a bakelite sleeve with a small projection around the inner end that the copper tubing shoulders against, thus preventing the copper from coming into contact with the malleable iron ell. A rubber sleeve fits against the bakelite, extending

Fig. 6. New copper tube gas service for a house in a new building development in Carter Street, Richmond, Va., showing connection at main and curb cut-off valve.



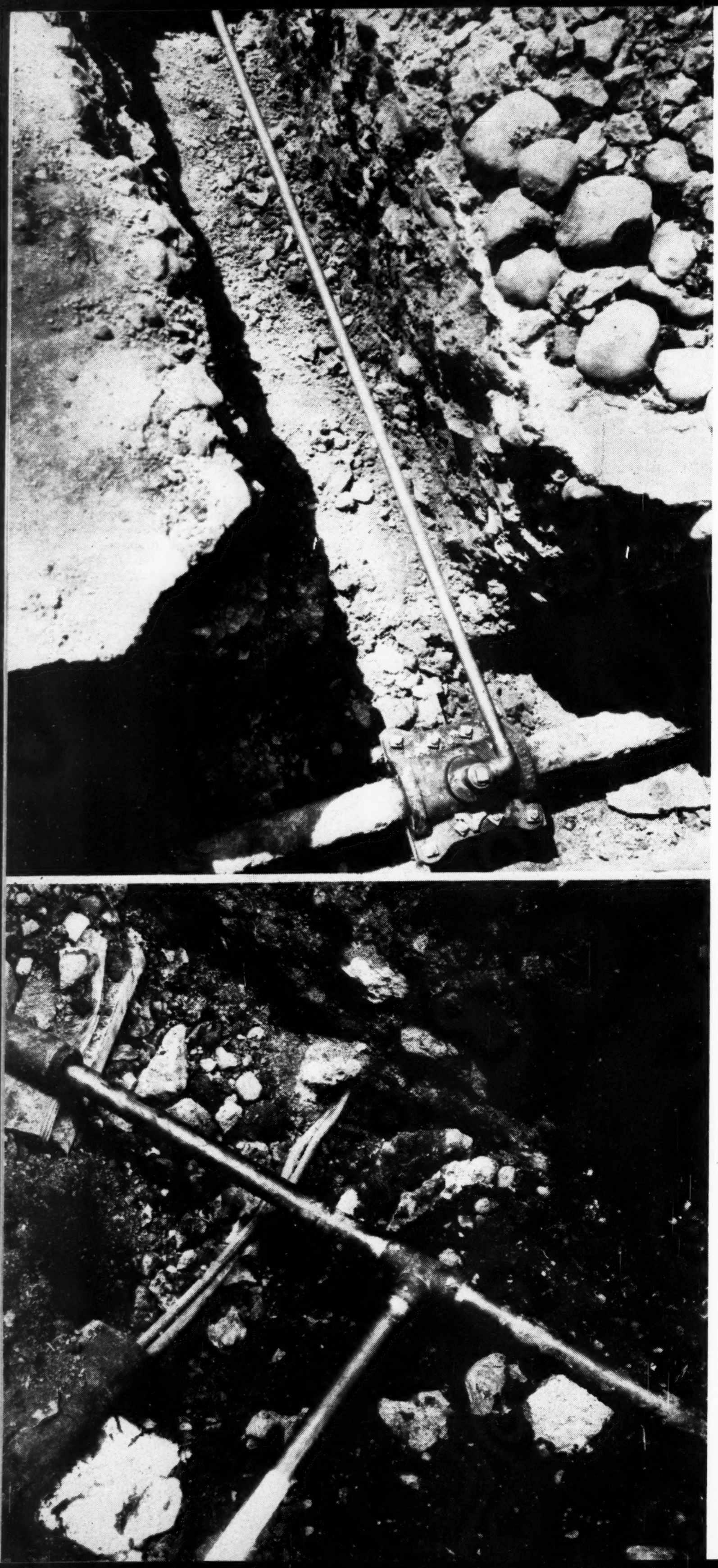


Fig. 7. Typical copper service with soldered fittings. (Cincinnati Gas and Electric)

out beyond the follower nut, thus insulating the copper from the follower. On the photograph attached *(Fig. 3)* the rubber sleeve can be seen extending out around the copper tubing beyond the follower nut; the bakelite sleeve is entirely inside the fitting and cannot be seen in the assembly fitting.

"The cellar end of the old steel service pipe is then cut off, threaded, and a rubber gasket inserted between the steel pipe and copper tubing and forced into place with a steel follower ring. This gasket is used to prevent water from entering the cellar through the annular space between the new tubing and the old service. We use drilled pipe caps for the follower rings. A brass adapter to change from tubing to iron pipe size is sweated onto the cellar end of the copper tubing. A house tee and a Dresser 45° insulating ell are installed on the adapter, and the connection to the meter is built up from that point with galvanized steel pipe and fittings."

This "procedure" is well illustrated with blueprints and photos that have not been reproduced for lack of space.

Equitable Saves

In Pittsburgh, Pa., Equitable Gas Co. began to use copper tube for gas service renewals in 1936. Notable savings have been made in both labor and material costs, since it requires about one-half as many man-hours to replace a copper service as it does for steel. Over 6500 steel services have been renewed with copper tube. Type K soft copper tube in 1-in. and 1¼-in. sizes is used. Typical details are shown in *Fig. 9.*

The Southern California Gas Co. has been using copper tube extensively for some time. Various sizes of tube are used, a considerable amount of it being ¾-in. Type K in 20-ft lengths. Over 200,000 ft of this size are being installed per month for new service installations.

For service replacements, soft drawn dimensional tube in coils is used, most of it being ½-in. or ⅝-in. nominal size. The copper tube is inserted through the old service pipe where it is possible to do so without reducing the capacity below that required to serve the customer. This practice is economical and practical in systems operating at high

Fig. 8. Replacement of corroded steel main by insertion of copper tube, showing soldered tee for branch connection. (Cincinnati Gas and Electric Co.)

pressure in the range of 10 to 20 psi. In the Imperial Valley (Calif.), formerly supplied with liquefied petroleum gas, but now being served with natural gas, copper tube is the choice as the soil corrosion problem is a serious one.

In the southern California area a method of joining tube differing from what has already been described is encountered. The end of the copper tube is heated red hot, then expanded to make a bell. The plain end of the next tube is inserted into the bell and the joint is made up with hard solder. Copper mains up to 3-in. have been installed and a rough estimate of the amount of copper tube installed in this area since its use was begun in 1940-41 is in the neighborhood of 5 million ft.

In Detroit

The Michigan Consolidated Gas Co. began experimenting with copper tube for service line replacements in 1934-35, threading the tube inside the deteriorated steel pipe. In 1936 a regular program using copper tube for all replacements, where practical, was begun and about 25,000 installations have already been made. Sixty and eighty-ft coils of 1-in. Type K copper tube are used as well as a special ½-in. tube with regular copper water tube outside diameter (⅝-in.) but with .065-in. wall instead of .049-in. Rubber ring compression joints are used at the main and in the basement, other joints are made with soft solder, using standard copper water tube couplings. The 1-in. soldered couplings can be drawn through a 1½-in. steel pipe.

A step-by-step standard procedure is furnished to the installing crew and this serves to assure uniformity. Sketches illustrate the operation. Previous experience with steel pipe in some areas indicated an expected life of from 12 to 15 years, but there has been no evidence of corrosion in the copper services in the same area over a period of 12 years. Here also the economies of copper have been realized and the good effect on public relations, where services have been replaced without tearing up streets and lawns, is considered of paramount importance.

Chicago Experience

In Chicago, the Peoples Gas Light & Coke Co. uses copper tube for service lines, both new and replacements. Use of copper for service replacement started in 1935-36. Several services in use eight or nine years have been removed for examination and have been found to be in excellent condition. No trouble whatever with copper service lines has been reported. Replacements are made with 1¼-in. hard temper Type M copper tube inserted through existing 1½-in. steel pipe. Connections at the main and at the cellar wall end are compression fittings, but intermediate joints are made as shown in *Fig. 5*. The sleeve, which is 2¼-in. long and is drawn to special outside diameter of 1.286 in. (0.042 in. wall thickness) to assure proper clearances for soldering, is centered by means of a small raised spot. The sleeve is tinned before entry into the tube.

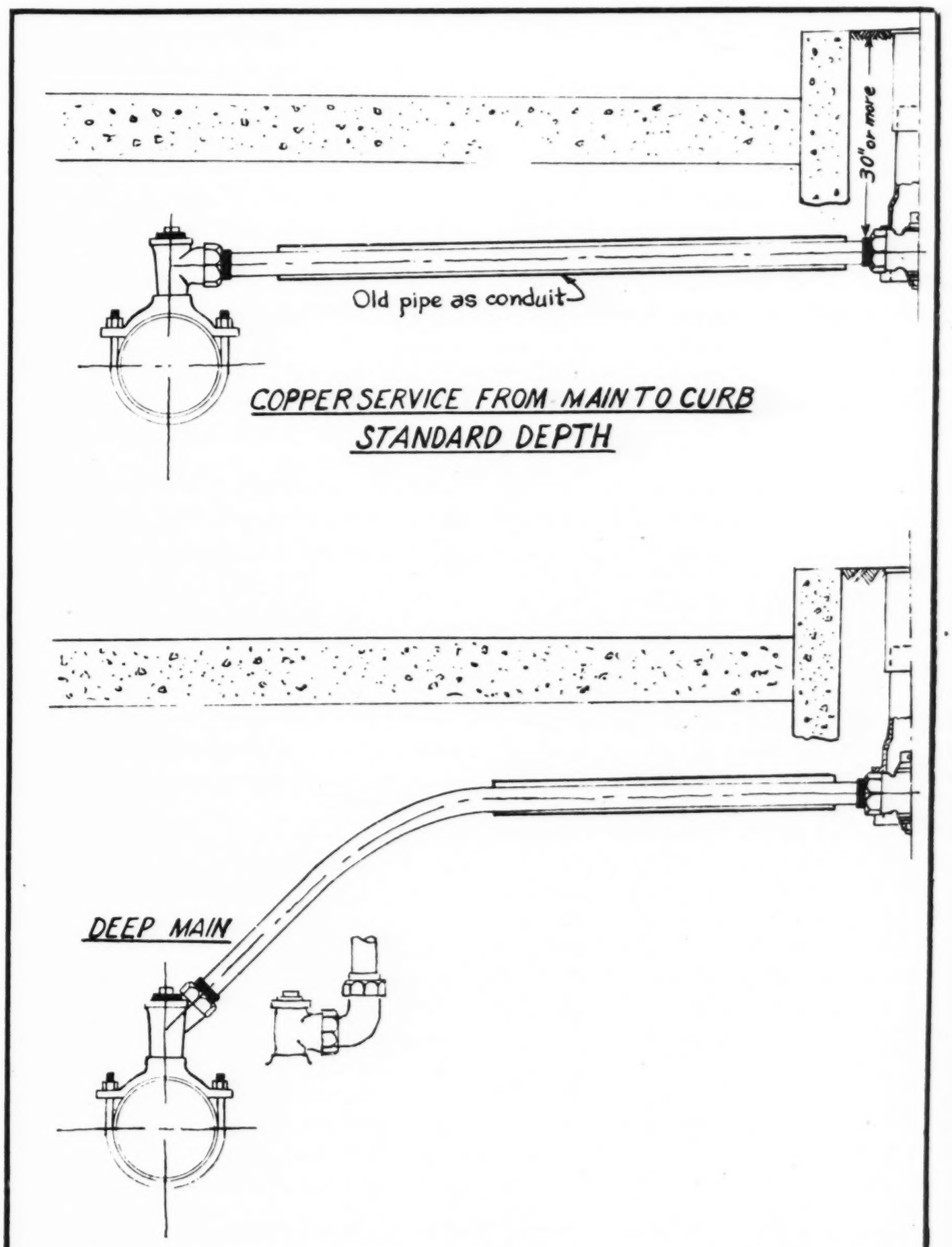
When copper is used in new installations, it is frequently possible to insert steel pipe as a mandrel. This is withdrawn and the copper tube inserted through the hole.

In 1948, more than 50% of the replacements were made with copper.

The Consolidated Edison Co. of New York began using copper tube for service line replacement in 1947 and about 7500 services have been replaced to date. The standard procedure is to use soft drawn, Type K tube, with Dresser fittings and connections. New ½-in. nominal (⅝-in. OD) services are being used to replace existing ¾-in. pipe services in high pressure areas. This size was drawn through the old service pipe and, at the pressures used, provides adequate gas capacity for the domestic consumer. Appreciable savings in labor have been accomplished with copper service replacement as against coated steel pipe.

There are numerous other communities that use tube for gas lines, such as Virginia Beach, Va. (see Sept. *GAS*, p. 60), Tracy, Minn., and many others that space will not permit describing in detail, but the foregoing record is complete enough to be fairly representative.

Fig. 9. Typical service line installations of copper tube. (Equitable Gas Co., Pittsburgh.)



How Joint Leaks on C

Were Repaired Interm

By H. M. HOPPE

JOB BREAKDOWN	
Important Steps	Key Points
1. Clean interior of pipe at joints.	Use wire brushes to remove loose dirt and rust. Use air-driven emery wheels to clean pipe surface to bright metal. Cone shaped emery wheels are best suited to clean out pits.
2. Fill space between joints of pipe.	Spaces less than ¼ in. wide require no filler. Spaces ¼ to ½ in. to be filled with lead wool. Not necessary to caulk in tight. Spaces over ½ in. to be filled with plastic putty. Metal must be clean.
3. Mix plastic sealer.	Mix slowly with power-operated paddles. Thorough mixing required. Mix in small quantities. A wax base should be applied to the hands before using. Ethylene dichloride is used to remove the sealer from the hands and tools. Because of the poisonous and highly inflammable qualities of ethylene dichloride, great care should be exercised in handling.
4. Apply plastic sealer.	Work into irregularities of pipe walls. Use small putty knife or spatula for applying. Apply in two coats to a total thickness of about 3/8 in.
5. Air test repaired main.	Air test at 5-lb pressure for about 48 hours.

REPAIRS to leaking bell and spigot joints in cast iron pipe are customarily made by recaulking or by the installation of bell joint leak clamps. These relatively simple solutions are not applicable, however, where the joints cannot be exposed by excavating.

Such a situation was recently encountered on a 30-in. cast iron main under a major street intersection in Los Angeles. On the surface of the street, crossing the intersection, in one direction lay the double tracks of a steam railroad, and in the other direction lay the double tracks of an electric street car system *(Fig. 1)*. Three hundred fifty-six feet of 30-in. main with 32 leaking bell joints is installed directly beneath the rails. The existence of two angles, one of which is at the point where the electric railway tracks intersect the steam railroad tracks, made it impossible to insert a smaller pipeline inside the old 30-in. main.

To expose the pipe would have involved a joint operation of the rail interests in order to support the tracks. Preliminary negotiations with the railway companies disclosed that the cost of the necessary supporting structure would approximate $15,000. This expenditure, before actual repair work could be started, was considered prohibitive.

A different approach was therefore made to the problem. This new approach centered on repairing the joints by an application on the inside of the pipe.

The first proposal for internal repair of the line involved the design of a clamp for interior installation. This device was the reverse of the type of clamp adapted for external repairs to cracked pipe or porous weld joints. The clamp contained two circular flanges with necessary bolts which compressed a center strip of rubber against the interior surface of the pipe joint. The design was practicable, but installation was found to be awkard, as it involved the assembly of some 58 items excluding tools, to clamp each joint. After trial repairs had been made on a joint of pipe in the yard, this plan was rejected, but the idea of making repairs by means of a fabricated inside clamp remained.

The second type of installation considered was that of 30-in. diameter cast iron rings, resembling piston rings, to compress a rubber gasket against the interior surface of the pipe at the joint crevice. Two rings were required at each joint, as the interior diameter of the spigot end was slightly greater than the diameter at the bell, and uniform compression was found to be impossible with a single ring. By peening the cast iron piston ring, a compressive force of over 240 lb was obtained.

With the gasket cemented to the surface of the interior wall, the ring, plus the internal gas pressure, make a tight joint. This type of joint was relatively simple and involved assembly of but five material items. The installation technique was in the course of development when an entirely different approach to the problem was suggested and was ultimately used on the job.

Solution

Within the automobile and aviation industries, a rubber-base, plastic compound is used for various purposes, one of which is a gasket material for use at the seams of the fabricated aluminum fuel tanks built into the wings of planes. Investigation of this product disclosed that the Brooklyn Union Gas Co. had made satisfactory use of it to seal, by internal application, leaking joints on a 42-in. bell joint pipeline passing under a subway.

The plastic material is a two-part compound; that is, the base product must be mixed with an accelerator. The base is a heavy, viscous black paste of organic polysulphide material weighing about 11 lb per gallon. The accelerator is an inorganic catalyst. The latter, when mixed with the base compound, vulcanizes the base into a tough, elastic piece of synthetic rubber possessing resistance to heat, cold, and solvent oils. Polymerization of the mixed product, at normal temperature, takes place in two to three hours, within which time it must be applied.

The product is applied to a clean surface with a putty knife, a small bricklayer's trowel, or similar tool.

The bond strength of this product, applied to clean metal, is 80 to 100 psi; the Shore durometer hardness, 45-50.

Before venturing on to the actual job of repairing internally the 30-in. cast iron pipe joints, preliminary investigation and trials were conducted in the company's engineering laboratory. By these tests, experience was gained in

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The author, supervisor of inspectors for Southern California Gas Co., Los Angeles, presented this paper at the Pacific Coast Gas Assn. Distribution Conference, held there April 7-8.

the mixing and application of the sealer compound, and, by demonstration, the behavior and strength under reproduced working conditions were observed. Samples of the compound, in sheet form, were bonded to metal and subjected to sheer stress, tensile stress, and vibration; then they were exposed under pressure to atmospheres of air, natural gas, and oxygen. Also, samples were subjected to alkali and acids. These tests paved the way for final application, and proved the compound to be suitable for use under variable conditions of exposure in gas distribution practice, and to the constant vibration to which it would be subjected under the railway crossing.

Two lengths of 30-in. cast iron, bell joint pipe were assembled with the caulked joints leaking, for the purpose of developing the procedure.

Surface Cleaning

Means for cleaning the pipe surface were developed, this being of first importance to secure adhesion when the compound was finally applied. It was found that wire brushes needed to be supplemented with power-driven emery wheels to secure clean metal.

The recess between the bell and spigot ends of the pipe, it was found, must be filled, as the sealing compound when applied will not bridge the space, particularly at the top of the joint. Lead wool proved suitable where the recess was not too wide. To meet overhead conditions and wide spacing, trials demonstrated the effectiveness of a somewhat different plastic material having extremely high adhesive qualities, which, when applied, was sufficient to resist the influence of gravity.

Following the development of the procedure, the repaired joints on the demonstrator setup were subjected to a sustained pressure test of 5 psi for a period of three months. No leaks developed. The joints were then placed under a hydrostatic pressure of 20 psi for a short period and proved tight.

Because of the favorable results of these experiments, the Southern California Gas Co. decided to use this method of repairing the leaking 30-in. bell joints under the railway tracks mentioned previously.

Because of the difficult traffic conditions at the job site, some preliminary planning was necessary to determine size and exact location of required excavations, methods of shoring and supporting street railway tracks, and maintenance of traffic flow. Also, preliminary to the actual commencement of work, consideration was given to the selection of means of illumination and ventilation of the pipeline interior, and to the transportation of men inside the pipe.

Because of the size of the pipe involved and the necessity for speed in cutting the line, some difficulty was encountered in securing an appropriate type of pipe cutter. A set of 32-in. Smith pipe cutters was borrowed for the job from The Peoples Gas Light & Coke Co. of Chicago.

Since the main to be repaired supplies gas to a major portion of downtown Los Angeles, it was possible to reduce pressure from the customary 80-in. w.c. to 10-in. w.c. only between the hours of 9:30 p.m. and 5:30 a.m. Sections had to be cut out at both ends of the portion to be repaired and the ends of the adjacent live line had to be temporarily bull-plugged. Pressure requirement made it necessary that this work be done during night off-peak hours. So that the work could be completed during the limited allowable time, the crew was given preliminary instruction and training in the technique of setting up and operating the pipe cutter and other equipment.

(Steps involved in making repairs by this unusual method are described on the following pages.)

Fig. 1. View of job site, showing route of main to be repaired. Existence of angles in pipe, proximity of intersecting rails necessitated ingenious method.

Internal Pipe Rep St

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The 30-in. cast iron main was found to be 32 in. deep, and in order to provide sufficient working space under the pipe, excavation to a depth of approximately 8 ft was necessary at each end of the length to be repaired. The two excavations were each 15 ft long by 6 ft wide. All four sides were shored. The south edge of the west excavation extended 24 in. under the railway company's rails, and it was necessary to install a 4 x 6-in. supporting timber beneath the ties *(Fig. 2)*. The street cars overhung the excavation by about 16 in., and. as a protection to workmen, a flagman was on duty at all times when the job was in progress *(Fig. 3)*.

The exterior of the exposed pipe was cleaned; 4-in. tap holes were made with an air-driven, low pressure tapping machine, and 30-in. stoppers were installed *(Fig. 4)*. Since the stopper area for 30-in. pipe is approximately 700 sq in., with a 10-in. w.c. pressure against it, the total pressure against the stopper was over 250 lb *(Fig. 5)*.

Two cuts, approximately 7 ft apart, were made between stoppers at each end of the section to be isolated, and the 7-ft lengths of pipe between cuts were removed. Steel bull plugs were then installed on the ends of the live line by means of 32-in. rubber gasket type couplings, and metal straps were installed to hold the bull plugs in place. The isolated section of main, approximately 356 ft long. was then purged with nitrogen, followed by compressed air, to clear the main of all gas.

To supply fresh air to the workmen, a venturi-type air mover was installed in the west excavation blowing easterly through the pipe *(Fig. 6)*. Since this setup did not move sufficient air, it was decided to install an additional air mover to withdraw air at the east end of the section. This double blower setup proved to be very successful.

In addition to the air movers, air motor driven emery wheels were used and it was found that a minimum combined air compressor capacity of 370 cu ft per minute was required for the job.

Small four-wheel dollies with rubber tires were provided to transport men and materials inside the pipe. The workers were equipped with various safety devices such as miners' lamps, goggles, respirators, and knee pads *(Fig. 7)*. Shortly after the job had started, it was found that the air movers supplied sufficient fresh air to make the use of respirators unnecessary. Because of cramped working quarters, the men were allowed to work inside the pipe only for periods of 30 min at a time, after which they worked outside for 30 min.

Wire brushes were used to remove loose dirt, rust, and other materials from the interior of the pipe for a distance of about 4 in. on each side of the joints. Small wire brushes were found to be easier to use on the curved surface of the pipe than the larger size brushes. Air driven emery wheels were used to clean the joints to bright metal. Casting pits were cleaned by using cone-shaped emery wheels.

The spaces between the lengths of pipe at the joints varied in width from $\frac{1}{8}$ in. to $2\frac{1}{4}$ in. *(Fig. 8)*. Before filler could be applied, these spaces were blown clean of dust and other loose material by means of compressed air. On joints where the space measured less than $\frac{1}{4}$ in. in width, it was deemed unnecessary to provide a filler. On joints where the space was between $\frac{1}{4}$ to $\frac{1}{2}$ in., lead wool was caulked into the recess between the face of the spigot and the shoulder of the bell to form a mechanical support for the plastic sealer *(Fig. 9)*. The lead wool was not intended to be gas tight and was not caulked extensively. Additional lead wool was caulked in until the lead was about flush with the inside

Step by Step

(Continued from previous page)

walls of the pipe. About 3 lb of lead was required for each joint.

It was found that lead wool would not stay in overhead spaces more than ½ in. in width. To fill these larger spaces, a special filler was used, which is a plastic material having the consistency of heavy putty. This putty is applied by first rolling between the hands until warm and then pressing into place. If left in contact with a clean metal surface for 30 min, it will adhere. It does not harden with age.

The plastic sealer was mixed by pouring a measured can of the accelerator into a gallon of the base material and stirring by means of a power-operated paddle. The paddle for mixing the material consisted of two triangles made of ¼-in. welding rod which rotated at approximately 200 rpm *(Fig. 10)*. Three minutes were required to mix thoroughly a gallon of the material. If a faster stirring rate is used, the mixture heats up, which in turn causes it to cure or set too rapidly. For normal temperatures, the mixture must be applied within two to three hours after being mixed.

After thorough mixing, the sealer was applied over the joints and worked into irregularities of the pipe by the use of small bricklayer trowels and spatulas with thin flexible blades *(Fig. 11)*. Two coats were applied to a total thickness of ⅜ in. The width of the seal was from 3 to 4 in. each side of the joint. In all, 14 gal of sealer were used to repair the 32 joints.

After sufficient time had elapsed for all of the plastic material to set properly, the repairs were successfully tested at 8 psi for a period of four days. After the air test, the repairs were reinspected and it was found that at those joints where no filler had been used, the sealer had been forced into the aperture, leaving the center of the repair about ⅛ in. low. An additional application of sealer was applied at these locations. Special attention was paid to repaired joints directly under the steam railroad tracks where vertical pipe movement of approximately ⅛ in. had been previously noted when trains were passing overhead. These joints were apparently as secure as the joints where there was no movement.

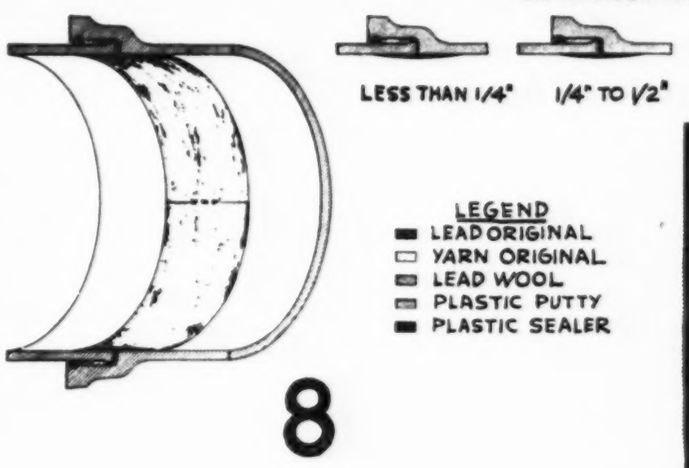
The 7-ft sections of 30-in. cast iron pipe which were removed to isolate the section to be repaired were reinstalled and tied in with 32-in. rubber gasket couplings.

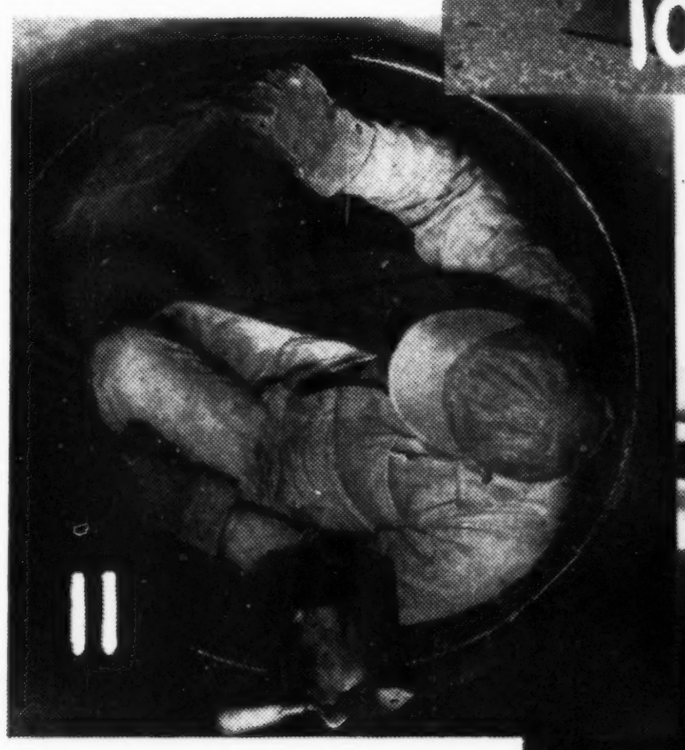
A barring survey conducted prior to the start of this job disclosed gas indications varying from 50% to 100% over the entire length of main to be repaired. Gas indications were also found in adjacent manholes.

After the repairs were completed, gas was still evident in three manholes. Leaks were found around the bonnets and top glands of gate valves in these vaults. A barring survey over the 30-in. main disclosed that gas leakage from this source had been eliminated.

Since completion of this job, plastic sealer has been successfully used by the Southern California Gas Co. for outside repairs to leaking 30-in. bell joints at two locations where other substructures are too close to allow for the installation of bell and spigot clamps. When this sealer is used on the outside of the pipe, it is necessary to install metal clamps around the pipe to act as forms to hold the material in place on the bottom of the pipe until it is cured. The cost of installing the sealer on the outside of the pipe is about equal to the cost of installing bell and spigot clamps, but it can be used in tight places.

This method of repairing leaking bell joints by internal application has proved satisfactory from the standpoint of results and costs, and we feel that the time consumed in research and experimental work was well spent.





An expert discusses problems and possibilities of piping gas to the northeast

What About Natural Gas For New England?

By ERICK LARSON

IN considering a natural gas transmission line to serve New England, the first question would naturally be, does the potential market in the New England states justify building a natural gas pipeline from the South or Southwest? An analysis of the area potentially to be served by such a pipeline indicates the population already being served by manufactured gas companies exceeds 7.3 million and the number of customers is more than 1.6 million.

Compare this with a single natural gas distribution system in the Appalachian area whose 1 million residential, commercial and industrial customers in 1947 purchased 164 billion cu ft of natural gas, which is an average of 449 million cu ft per day, or equivalent to the capacity of approximately 1½ 26-in. pipelines. Therefore, the demonstrated requirements of other areas indicate that, with equivalent sales, more than two pipelines 26 in. in diameter would be required to serve New England.

Taking collectively the states of Illinois, Indiana, Michigan, Ohio, New York, Pennsylvania, Maryland, Virginia, West Virginia and Kentucky and the District of Columbia, it is interesting to note that the residential sales of manufactured gas in therms per customer in 1946 amounted to 184 and in 1947 approximately 200. The mixed gas sales in the same classification totaled 335 therms in 1946 and 400 in 1947. Natural gas sales similarly aggregated 658 in 1946 and 787 in 1947. While independent states or companies differ somewhat, it is interesting to note that the relative sales in the residential classification were approximately 200 therms for manufactured gas, 400 for mixed and 800 for natural gas. A comparison of the commercial and industrial sales in the states mentioned indicates the market possibilities with mixed or straight natural gas are even more favorable than in residential.

The gas purchased or produced by New England manufactured gas distributors within the possible service area of a natural gas transmission system amounted to some 74 billion cu ft in 1947. This is equivalent to 241 therms per customer per year. It is therefore reasonable to expect that if all these New England distributors changed to mixed gas and increased their sales to the level now experienced in other sections of the country, the peak-day requirements of natural gas would aprpoximate 325 MMcf.

It is not anticipated that all of the New England distributors would immediately change over to the distribution of straight natural gas. Considering only the possibilities of mixed gas, it appears that the natural gas requirements of New England gas distributors would justify a single line and possibly two lines after fuller development of natural gas possibilities. This statement assumes there will be no material increase in costs of pipelines.

Another question which has been raised is whether authority could be secured for a line which would primarily supply a single area. A review of the pipelines now in existence indicates that to date all of the lines constructed have supplied a given area. Some of the early lines were those to Denver, Chicago, St. Louis, Detroit and Atlanta. These lines, constructed in the late 20's or early 30's, have increased their ability to serve the areas then taken on but have made no major attempts to expand into other large population areas. In recent years the major pipelines have been constructed from the Southwest into California and into the Appalachian area. A major pipeline has been authorized recently to serve primarily the Philadelphia-New Jersey-New York City area.

There are several natural gas projects under consideration to serve the New England area including both extensions to existing systems and new lines from the Southwest. The history of the Federal Power Commission appears to indicate that it does approve of lines whose purpose is primarily to serve certain large areas.

The shortest route from the Southwest into the New England area would be through the Appalachian area and into Connecticut near its northern border. It may be that certain cities in the east central part of New York State would be served from such a line. Following such a route the proposed line would parallel existing lines from the producing fields well into New York State. The usual practice has been for the existing lines to intervene in certificate hearings and protest against any service by the new line to already developed markets. Where such opposition has been directed to undeveloped markets it has not been generally successful. The Federal Power Commission has given consideration to alternative proposals for service to an area by existing and new projects. The city gate price and adequacy of the service to be rendered appear to be the primary factors affecting the decision.

Underground Storage

An advantage of going through the Appalachian states is that any New England line might be able to provide underground storage in existing depleted natural gas fields.

It has already been stated that the natural gas reserves in the country are equivalent to some 30 years of existing requirements. The major pipeline companies generally have reserves equivalent to some 15 to 25 years of requirements under contract. There are large volumes of proven reserves which have not been dedicated to any particular project. A frequent objection on the part of producers to entering into long-term contracts for sale of their reserves is doubtfulness as to their status under Federal Power Commission regulation. The FPC has, in a number of instances when requested for a status determination, issued orders stating that the producers are not subject to federal jurisdiction. Legislation is now before Congress to define more clearly and limit the commission's authority over production. It would be necessary for any pipeline operator proposing to serve New England to secure by direct acquisition or purchase contract some 2 to 2½ trillion cu ft of reserves.

Another problem is the price to be paid for natural gas. The field price for natural gas has risen rapidly in the last few years. An important factor in raising the price has been the FPC's apparent policy that a company must have not only reserves equivalent to a certain number of years' requirements but must demonstrate that from those reserves there will be quantities available even in the latter years of production equivalent to the maximum pipeline requirements. This policy requires tying up such huge quantities of reserves for such long periods that the price is naturally affected. However, pipeline operators have been able to

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This article is a shortened version of a paper delivered at the NEGA annual meeting March 24. Mr. Larson is with Ford, Bacon & Davis, New York, management engineers.

PERTINENT QUESTIONS

- **Does market justify a long distance pipeline?**
- **Could FPC approval be obtained for a line serving a single area?**
- **What is the best route for such a line?**
- **Would customers and distributors benefit financially?**
- **How will rate bases be affected?**
- **What are vital time factors?**
- **Will natural gas attract industry to the area?**

secure adequate supplies at a price. The more favorably located reserves must be acquired in the near future or the length of pipeline required will be affected adversely.

Recent pipeline builders have contracted with producers for the total reserves required. Consideration must be given by any new operators to the purchase of at least part of their requirements. The reason for this statement is the fear on the part of producers of tying up reserves for long periods of time without clauses which will cancel the contract should the FPC assume jurisdiction.

Determination of the potential market for a New England pipeline is of equal importance to securing a gas supply. Financing of a pipeline project requires that practically the total pipeline capacity be assured and that a major portion be under contract. On the other hand, where operators have had contracts for the full capacity, the FPC has granted certificates only on condition that others than those with whom contracts have been made should be served. Both the pipeline company and the distributors have an obligation to present proof of the existence of a market adequate to make the project financially sound. It is believed with proof that the distributors are willing to commit themselves collectively to take practically the line's capacity.

Status of Distributor

It is essential that distributors be able to offer proof of financial ability to construct any facilities necessary to utilize natural gas and to change over to a higher Btu mixed gas or straight natural gas. It is also necessary for a distributor to show in commission hearings that utilization of natural gas is within the legal bounds under which he operates.

In practically all hearings before the FPC involving projects in which a distributor is required to construct a certain amount of transmission line from the delivery point into the distribution system, the distributor is asked whether he would be willing to become a natural gas company provided the commission ruled that the facilities to be constructed would result in determining the status of the distributor to be that of a natural gas company.

One of the primary requisites the Federal Power Commission considers in determining public convenience and necessity is whether the public will be served at rates less than those presently in existence on a therm basis.

There could be no argument that on a therm basis the lowest rates generally exist in those areas served by straight natural gas, followed by mixed gas, and the highest being in those areas served with manufactured gas only. It is therefore to be expected that with natural gas there would be some reduction in rates which, in turn, would increase the market.

Second, manufactured gas companies are in general earning an inadequate return and it appears that this condition is rather prevalent in the New England states. It is believed that natural gas could be made available to New England at a rate which would make it possible to provide an adequate return under whatever basic principles of regulation the distributors are now operating and at the same time allow a rate reduction.

Third, it is to be assumed that New England regulatory authorities would follow the general practice throughout the country of allowing existing manufacturing facilities, including possibly benches and vertical retorts to remain in the rate base but be amortized at an accelerated rate. This assumption was considered in stating that natural gas would undoubtedly provide the means of obtaining an adequate rate of return. Much of the gas-manufacturing equipment in the New England states is old. It is my opinion that during the period of availability of natural gas this plant equipment will have become obsolete. An economic advantage therefore will be an ability to provide an accelerated amortization rate for obsolescence.

Fourth, the question has been raised as to attracting industry into the New England area because of the availability of natural gas. There are many factors affecting industrial location, one of which is the availability of adequate fuels at a reasonable price. My personal views are that with the present demands for natural gas in the residential, commercial and firm industrial classifications, use of natural gas as a boiler fuel should at least be minimized. Such a policy would result in the bulk of the boiler fuel market continuing to be served by coal and oil. It is to be expected that the industries already located in the New England states would provide the bulk of the market at least for a number of years and therefore availability of natural gas, while possibly influencing some industries to locate in New England, would not necessarily be the source of any immediate considerable load.

Vital Time Factors

Important time factors are securing adequate reserves and a supply of pipe. Once a project has determined that the markets exist in New England, a supply of gas would have to be secured before hearings would be held by the FPC. It usually takes approximately a year from the initiation of a project until such hearings are held. There are usually clauses in natural gas purchase contracts which stipulate that if a certificate has not been secured by a certain date, which may be a year to 18 months subsequent to signing the contract, the contracts become null and void. Once such contracts have been signed the project must be pushed vigorously.

Negotiations for the purchase of pipe proceed with securing a supply of natural gas. There have been various successful methods employed to have pipe contracts signed before hearings are held by the commission. The general feeling is that by the time any project to supply New England reaches the pipe requirement stage, such material will be available at a lower price.

Negotiations for a supply of gas would be with only a comparatively few producers. The same applies to pipe. It appears that one of the more important time factors in providing natural gas for New England will be determining market requirements which depend on distributor policies. There are numerous distributors in the New England area and there appear to be more diverse interests and problems than it has been my experience to find in other areas. Full exploration of the potentialities and localization of the economic advantages and service possibilities will require considerable time.

If the companies of New England wish to have adequate supplies of natural gas within the reasonable future, I suggest that the most important time factor is entirely within their own control. That time factor is the determination of policies to the extent that the Federal Power Commission will be convinced that public convenience and necessity justifies a line into the New England states.

Cathodic Protection Economies

Benefits revealed in study of experiences of two operating companies

By **A. W. PEABODY** and **C. L. WOODY**
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(Condensed from paper presented at National Assn. of Corrosion Engineers meeting Cincinnati, April 11-14.)

THE majority of the gas distribution systems of the two companies referred to herein lie in areas where the corrosive soils are the rule rather than the exception. Corrosion on mains and services long has been a serious problem leading to early investigation of the possible advantages of cathodic protection.

Initial investigations were made as early as 1935 but first permanent installations were engineered and installed in 1941. Since 1941, cathodic protection has been installed progressively until at present approximately 42% of all steel mains are under protection by Company "A" and 7% by Company "B."

The nature of cathodic protection is such that an extended period of time often passes before success or failure of an installation may be judged. For this reason, a report on some of the early installations will have the greatest weight. First, two installations by Company "A" will be described: one on an old and corroding section of an existing system, the other on an entire small distributing system, carrying 96 services, which was protected very soon after completion.

The first installation mentioned consisted of application of cathodic protection to a 1.2 mile section of a 12-in. steel belt line of a city distribution system. In 1941 this line, which was 11 years old and had an enamel protective coating without wrapper, was developing leaks so rapidly that extensive replacements were contemplated. This section has been protected since 1941 with two small rectifier units. During the years since, no further serious corrosion difficulties have been experienced. The remaining 3.4 miles of this 12-in. belt line were placed under cathodic protection in 1942 and 1943. Pipe inspections made in this area in 1941 revealed that corrosion was very severe, indicating that early replacement of about 1500 ft of pipe would be necessary if protection was not applied.

In 1948, after nearly six years of cathodic protection, a detailed leak survey was made on this section prior to installation of concrete paving over the line by the city. Only two corrosion leaks were found on a 12-in. main in this section. These were the only ones which had developed since the repair of those found in 1941. These leaks were in areas found badly corroded in 1941 and 1942 and it is believed they were caused by pressure increase in the last few years perforating deep pits which existed when protection was applied.

If this line had been allowed to corrode freely during the past six years, it is estimated nearly 150 leaks would have occurred; this is in conformity with respect to progressive increase in rate of occurrence of leaks on a corroding line. This in itself would have resulted in costly leak repairs, increase in unaccounted gas losses, and probable main replacements. It is estimated that it would have cost at least $10,500 to replace 1500 ft of main in this area.

Early Protection

The other cathodic protection installation made in 1941 by Company "A" was on an entire distribution system less than a year old, which was coated with coal tar enamel and asbestos wrapper. During the last seven years, only one corrosion leak has occurred on this system and upon investigation a service failure was found on a particular service which was not tied into the cathodic protection system because of accidental insulation at a coupling which had been left unbonded. All other services and mains in this system are receiving protection and wherever they have been buried the pipe is in new condition with no evidence of corrosion.

Corrosion leak results are also available for a third installation that was made in 1941 on a 12,200-ft section of 6-in. high pressure gas distribution feeder which in 1941 was 10 years old, with a record of 13 leaks.

Leak records of Company "B" on 111 miles of 3-in. equivalent old steel pipe under protection showed that 79 leaks developed the year prior to the application of cathodic protection while only 11 leaks appeared during the year following protection with an additional two leaks developing in the next six months. Direct current requirements for cathodic protection on these systems are supplied by rectifier units and galvanic anode installations. At present there are 63 rectifiers and 214 galvanic anode installations (totaling 25,800 lb of zinc, 20,100 lb of magnesium, and 200 lb of aluminum) protecting 538 miles of 3-in. equivalent steel main. This company has found that by using zinc or magnesium anodes it is possible to install galvanic anodes satisfactorily at practically all locations where it is desirable to provide cathodic protection. The material used and the arrangement of the individual anodes is determined by the desired current output, soil resistivity, space available, and to some extent the chemical composition of the soil.

Complete Study

It is the policy of this company to make a complete investigation of the pipeline to be protected and the soil in the vicinity of the pipeline before the actual anode installation is designed. The anodes always are installed in permanently moist soil having low resistivity. Whenever possible, the magnesium anode installations are adjusted for 10-year life. Zinc installations normally are adjusted for a 20- to 30-year life, depending upon the pipeline coating. Zinc anodes are installed in augured holes, and backfilled with a special backfill mixture consisting of 50% drilling clay and 50% gypsum molding plaster. This backfill mixture may be used dry or mixed with water and poured in the hole in the form of a slurry depending upon the local condition and equipment available. The amount of mains and services which may be protected by any one rectifier unit or galvanic anode installation depends to a great extent on the type and condition of pipe coating used.

The cost of preparing a new town

Presenting four articles digested from papers delivered at meetings of corrosion engineers, New England gasmen, and AGA distribution experts

distribution system for cathodic protection on grease-coated piping was shown to be exactly 1% of the total cost of the distribution system. Company "B" has applied protection to $224,000 worth of new enamel coated mains and service during 1948 for less than $1500 or 7/10 of 1% of the installed cost. When it is considered that the life expectancy of these mains and services has been extended to a minimum of 20 years at a cost of less than 1%, it is hard to realize why all operators of underground structures are not applying 100% cathodic protection. Average replacement cost per mile of 3-in. equivalent is estimated to be $6000. The use of cathodic protection on the old mains resulted in an out of the pocket savings of from $4920 to $5600 per mile of 3-in. equivalent. That the outstanding factor to be considered in a cathodic protection application from an economic standpoint is the fact that the whole distribution system of a gas company can be protected completely for the next 40 years using galvanic anodes, for less than $5 per mile per year. Periodic tests are made on each installation in a cathodic protection system to determine whether or not protection potentials are being maintained.

Corrosion Surveys and Leak Rates

Correlation of survey results and actual pipe condition shown in extensive study

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(Condensed from paper presented at National Assn. of Corrosion Engineers meeting, Cincinnati, April 11-14.)

THIS paper is concerned primarily with correlation between corrosion survey findings and actual pipe conditions as found during continuous reconditioning. However, since an extensive program of spot reconditioning had been performed on one of the lines, and since this spot reconditioning had a pronounced effect on the correlation study, certain data relative to its effectiveness are presented.

A corrosion survey was made over the entire length of the "Borger-to-St. Louis" products line in 1937 which consisted of walking the line and locating by visual means portions of the line likely to be corroded. A detailed corrosion survey consisting of measuring pipe-to-soil potentials (to copper sulfate) and line currents was made in 1938 and 1939 on these sections of the products line. Where it was ascertained positively that a corrosive condition existed on the line the section of that line was classed as "severe" and the recommendation was made for reconditioning. Some "doubtful" sections of the products line were inspected further by digging bell holes and checking those areas considered to be the more seriously corroded within the "doubtful" section.

A spot reconditioning program was inaugurated in 1939 and reconditioning was formed in accordance with corrosion survey recommendations. The program consisted of uncovering the pipe in "severe" areas and at inspection points and, in the event that the pipe was found to be severely corroded, the coating was stripped off until good pipe was reached at both ends of the stripping. Where necessary, welding repairs were made in the form of a full sole, patches, or spot welds. Following the welding repair, a 3/32-in. minimum thickness coal tar enamel coating was applied; however, the coating was not wrapped nor was a holiday detector used. This situation was soon corrected and the later work was wrapped with a 15-lb coal-tar impregnated asbestos felt, and the holiday detector was passed over the coated pipe. Cathodic protection was applied in certain areas of high leak frequency.

A total of nine units had been installed on two sections of the products line, four of which were rectifiers, four wind-driven units, and one an engine generator. Each unit—the first of which was installed in 1939 and last in 1946—fully protected about one mile of line.

The crude oil line was laid in 1933 of 8⅝-in. OD plain end pipe; joints were electric welded. New pipe weighing 24.69 lb/ft was used in laying one section; used pipe of various weights was used in the remaining section. Nominal cover of both sections was 24-in. Corrosive areas were coated with an asphalt-chromate emulsion applied at a rate of five or nine drums per mile. Since only a small portion of the total length (8%) was covered with this virtually ineffective coating, this has been considered as a bare line, and no attempt has been made to separate coated from uncoated sections in interpreting the results. A detailed corrosion survey, similar to that conducted on the products line, was made on this line in 1942 and 1944. Very little spot reconditioning (only about 3½% of the total length) was performed in accordance with the recommendations of the corrosion survey. Cathodic protection was installed in two locations of high leak rate. Numerous cathodic protection spread tests were made at various locations, but current requirements for full protection were so great that a cathodic protection plan was abandoned. A pit-depth survey was also conducted on the line. The depth of the deepest pit on each 20-ft of pipe surface was recorded when the maximum depth was less than 100 mills; when pitting was 100 mills or greater in depth was encountered, the depth of the deepest pit was recorded for each 5-ft section.

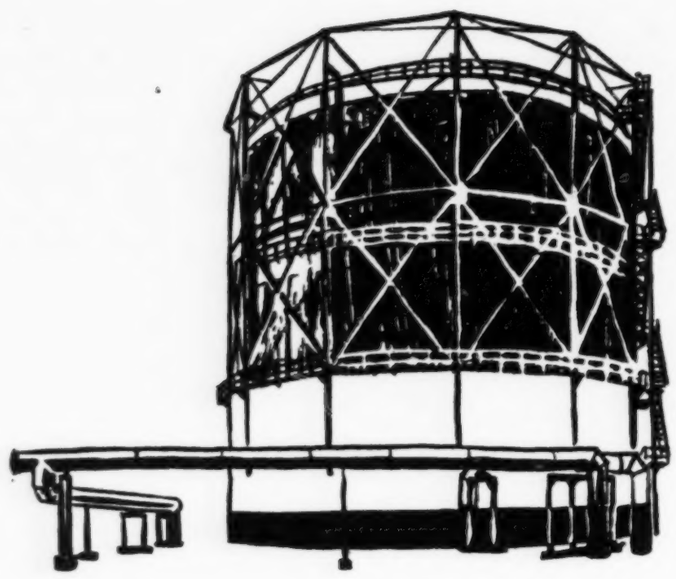
Data Classified

Data presented in a tabular form may be classified into two general categories: 1. Data pertaining to the correlation between leak rate and corrosion survey findings. 2. Data pertaining to the correlation between pipe condition (as evidenced by pit depth measurements) and corrosion survey findings.

Leak data is presented in a graphical form in three general classifications. 1. Total leak experience. 2. Leak experience in "severe" and "doubtful" areas. 3. Leak experience in "good" areas. The curve for leak experience in "severe" and "doubtful" areas in each case has been extended to estimate the number of leaks which would have occurred had no spot-reconditioning been done.

A correlation between leak experience and corrosion survey classifications according to the three classifications previously mentioned gave the following results: Overall, 51% of the leaks experienced were in the 10% of the total length classed as "severe," 16% were in the 11% classed as "doubtful" and 33% in the 79% classed as "good." The above figures have not been corrected for the effect of spot-reconditioning in retarding the leak rate. When these corrections were made it was estimated that approximately 93% of the leaks would have occurred in the 21% of the line classed as "severe" or "doubtful" and only 7% in the 79% classed as "good." Attention is called to the fact that within sections A and B almost all deep pitting has occurred in previously reconditioned portions of line.

It appears that the effect of spot-reconditioning and coating has been to concentrate and intensify pitting, with the result that pitting is deeper although perhaps not so widespread as in previously spot reconditioning and coated sections. In order to compare the pit depth data equitably, the number of 5-ft sections falling within each of the three



categories has been expressed on a per mile basis. These results show the number of 5-ft sections per mile containing pits in excess of 100 miles in depth, and those in excess of 200 mills in depth. In fact, it will be observed that the "good" Section D has more deep pitting than the "severe" of any of the other three sections. Attempts were made to improve the accuracy of corrosion surveys by comparing past corrosion survey measurements with actual pipe conditions. Where this study afforded explanations for certain specific cases, it was found that they would not hold true to others. The results of this survey have, therefore, not helped to improve the accuracy of corrosion surveys.

The following conclusions were reached on the basis of the corrosion surveys conducted. 1. Corrosion surveys were found to be accurate to the following extent: a. Correcting for the effect of spot-reconditioning, it is estimated that by classifying 21% of the total length as "severe," 93% of the corrosion leaks can be determined. b. Making no correction for the effect of spot-reconditioning (i.e., using the data obtained without modification). (1) By classifying 21% of the total length as "severe" or "doubtful," 67% of the leaks can be predetermined. (2) By classifying 21% of the total length as "severe" or "doubtful," 65% of the bad pipe based on 200 mill depth (or 50% based on 100 mill pit depth can be predetermined). 2. Spot-reconditioning in accordance with corrosion survey recommendation is not effective for any long period of time without supplemental cathodic protection. 3. The accuracy of corrosion surveys cannot be improved as a result of this survey.

Simplification and Standardization

Streamlining of appliance fixtures and operating manuals is in the wind

By W. C. PETERS and GEORGE B. JOHNSON*

(Condensed from a paper presented at the AGA Distribution Conference, Cincinnati, April 4-6.)

A program of simplification has been submitted to the AGA where it has been considered by the Committee on Gas Appliance Installation and Service Manuals and the various subcommittees on approval or listing requirements.

Today's serviceman must have a working knowledge of the physical properties of gas, the physics of pressures, the chemistry of combustion, the fundamentals of electricity and electronics, and the mechanics of all types of controls which make the appliance automatic. This is a big order, and the AGA is progressively attacking this problem in its various committees on personnel selection, training programs and service manuals. The picture can be completed if we can set up a few *standards on the application of control adjustments and the accessibility of controls* which will not hamper the ingenuity, skill, or progress of the manufacturer.

The specific items in standardization that have been presented to the AGA apply to all appliances, ranges, water heaters, refrigerators, gas plates, incinerators, driers, space heaters, house heating units, plus the entire field of industrial and commercial appliances. Concentration should first come where improvement will do the most good—the domestic appliances.

Here are some of the recommendations that are under consideration at this time:

1. Nut sizes on all valve covers, caps or plugs on all controls of all types and makes, shall comply with certain standardized sizes.

   (a) For domestic appliances they shall be limited to three hexagon sizes.

   (b) Additional provisions for screwdriver or Allen wrench application shall be optional.

2. All studs or set screws for fastening valve handles, dials or control levers shall be of Allen head design.

   (a) On domestic appliances these sizes shall be limited to not more than four.

   These provisions do not prohibit the use of friction type fittings.

3. All adjusting screws for control of pilots and minimum flames shall be of Allen head design where such parts are located in a control body.

   (a) These provisions also apply to reversible orifices similarly installed.

4. All flange screws or bolts shall be fillister head for regular or Phillips screwdriver application and may, in addition, be of hexagon head pattern.

   (a) Where such screws or bolts are in the combustion chamber or in a high heat or corrosive zone, the screw or bolt heads must be of hexagon shape. Air shutter screws are included in this group. In addition, such screws or bolts may have provision for regular or Phillips screwdrivers or Allen wrenches.

5. The method of attachment of similar panels on similar appliances shall be standardized.

6. All fastening nuts or devices that are inaccessible shall be self-aligning and be retained in position.

7. A uniform system for marking controls of gas appliances shall be established for identification purposes.

---

*Mr. Peters is assistant gas distribution engineer, Northern States Power Co., St. Paul, Minn., and Mr. Johnson is customer service manager for Minneapolis Gas Co.

This NEW Liquid Filled GAS SAFETY PILOT

in combination with Solenoid Gas Valve gives gas heating new SIMPLIFIED INSTALLATION

TYPE 2532
Combination Valve and Pilot

...brings you these outstanding features:

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Liquid-filled safety pilot, actuates S.P.S.T. electric switch. Available with universal mounting brackets, 30" capillary, angle or vertical fittings.

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8. All orifices should be of standardized hex and thread sizes.

9. All auxiliary lamp bulbs should be of standard size.

10. All electric wiring should be of standard color code.

11. All appliances must meet accessibility and other requirements as set forth by the AGA in order to carry the AGA seal.

It has been proposed to the AGA that manufacturers' service manual material be standardized to a pocket-size loose-leaf edition approximately 4½ x 6 in. Several operating companies are already publishing handbooks in that size and adoption on a nationwide basis would permit any gas utility or other agency to assemble an up-to-date ready reference handbook containing the material pertinent to the appliances and controls in use in the territory.

Part I would contain local operating procedures on meter setting, gas leak operations, safety, etc. Each company would have to produce the material for this part of the book, but having available the procedures of other companies might be of value in modernizing some of their methods.

Part II would contain the service manual material and be classified by ranges, water heaters, etc. That would enable a factory representative demonstrating a new control also to pass out sheets showing a cut-away of the control with concise instructions that would fit right into the handbook of the serviceman.

Part III would contain tables and useful information, such as flow tables for orifices, capacities of meters, tap and drill sizes, gas, water and flue pipe capacities, etc. Index systems could be used by each company to permit the perpetual addition or removal of pages to meet current needs.

Air Conditioning in New England

Summer load potential great enough to warrant extensive sales program

By H. WILLIAM DOERING

Mgr., House Heating and Air Conditioning Dept.
Springfield (Mass.) Gas Light Co.

(Condensed from paper presented at New England Gas Assn. annual meeting, Boston, March 24-25.)

SUMMER cooling requirements are greater, by far, in New England than we have been led to believe by those who would choose to scoff at the idea. The old theory of only 10 to 15 days of cooling requirement has been disproven by figures of gas consumption already obtained on existing equipment on our lines. The estimation of cooling requirement is distorted, once again, by the human element which has its preconceived idea of the extent to which moisture and temperature should be lowered to satisfy their comfort desires.

The year-round unit injects a new load in the most desirable period of the year from June to October, and for the most part, on existing lines and to an extent that is bearable, desirable and profitable.

The three charts presented show figures obtained on some of our installations in Springfield. The one in *Fig. 1* presents the poorest picture. We have a rather low summer use and a relatively high winter consumption. This is due to the type of building in which the unit is installed, as well as the use of the building from a cooling requirement standpoint. In *Fig. 2* an average curve taken from some 20 or more units in operation is shown. Here the summer load is equal to the winter load. In *Fig. 3* is the gas man's pride and joy, summer consumption only and little or no winter use.

The increase in summer load is very desirable at this time to the plant engineering department that is considering a means of balancing the gravity of the gas from one end of the year to the other and this, we understand, is most necessary when a higher Btu gas is being considered. We cannot, of course, forget for one moment the possibility of natural gas for this area. The demands of natural gas accentuate the need for good load factors.

I would like to convert the value of one gas year-round air conditioner in terms of other appliances. One Servel air conditioning unit is equal to 17 gas water heaters of average size or is equivalent to 25 gas ranges in use in the average home, or replaces in consumption 23 gas refrigerators. The Springfield Gas Light Co., a 70,000 meter company, now has approximately 9000 gas refrigerators on its lines. The sale of 390 Servel year-round air conditioners would equal this entire load and sales effort.

The best laid plans for any sales campaign can be routed unless all possible information can be obtained on the strength of the opposition and the weak spots in his defense, so let us have a look at what competition has to offer. Our competitors are, for the most part, the electric compressor type air conditioning contractors. The air conditioning load is a grand headache to the electric power salesman, in that he is faced with very undesirable problems of peak load and costly distribution factors. The electric salesman, therefore, does not help his fellow worker, the contractor.

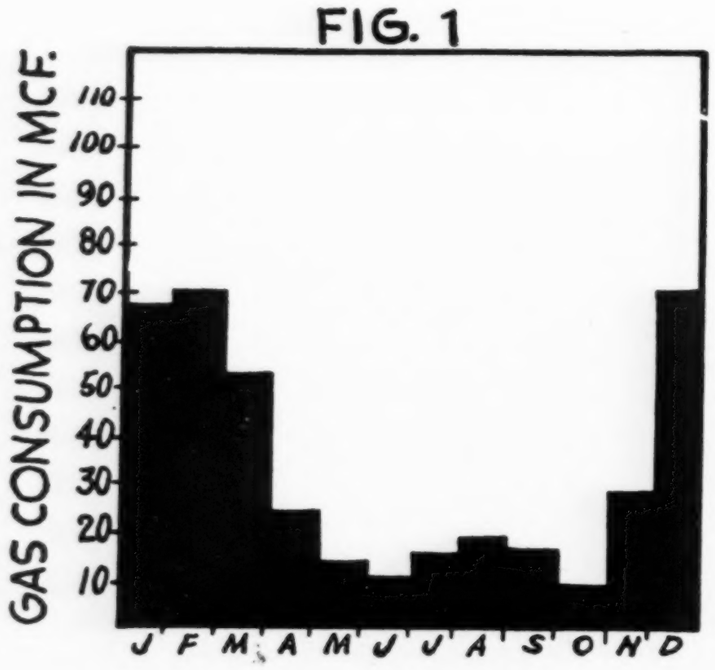


Fig. 1. The poorest type of load.

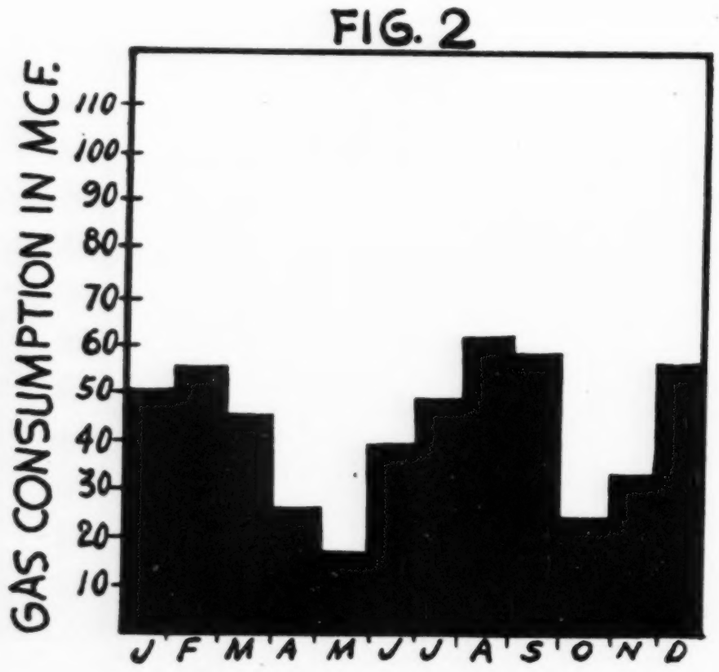


Fig. 2. Average year-'round load.

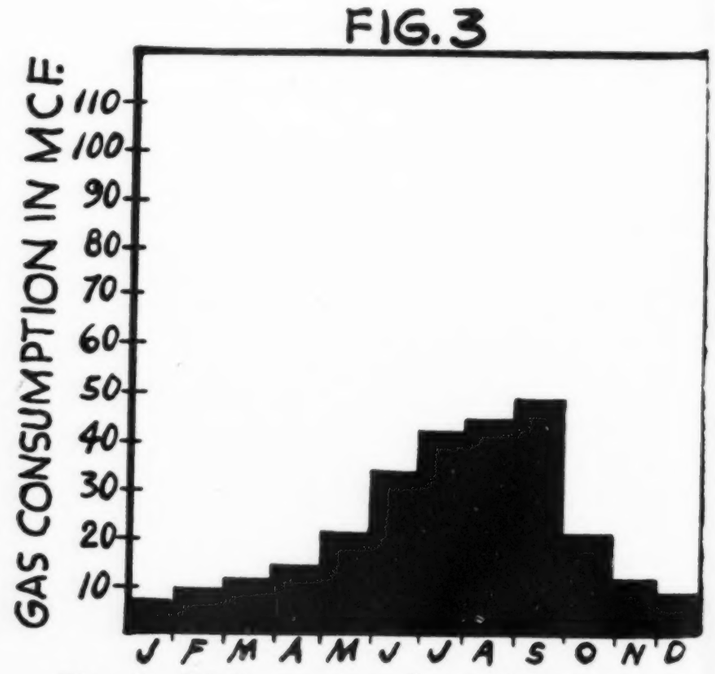


Fig. 3. High summer, low winter use.

ASSOCIATIONS

Standardization

Servicing troubles drama hit of distribution show

Up-to-the-minute discussion of such matters as standardization, motor vehicle safety, mobile radio, and the effect on meters of a change to mixed or natural gas brought together 750 persons, a record number for the AGA Distribution, Motor Vehicles, and Corrosion Conference, at the Netherland Plaza hotel, Cincinnati, April 4-6.

In a brief news report it is impossible even to scratch the surface of the wealth of material presented at general sessions and off-the-record luncheon conferences, and there were numerous events that attracted packed audiences.

For instance, the paper of W. C. Peters of Northern States Power Co., St. Paul, Minn., and George B. Johnson, of Minneapolis (Minn.) Gas Co.

In an ingenious scheme of dramatization, the authors presented a colored movie in which today's serviceman's problems were presented in a tragi-comic manner. An SRO audience reacted with sympathetic laughter. Even after the visual part of the movie was over the serviceman's words kept coming over the loudspeaker, from a record, commenting on the speaker's remarks.

The serviceman's soliloquy, as he was loading his car, commenced:

"Boy, it sure takes a pile of tools to fix a gas appliance. You would never think someone would think up so many sizes and types of nuts, lugs and whatnot . . ."

The paper called attention to the proposal to the AGA that manufacturers' service manual material be standardized to a pocket-sized loose leaf edition approximately 4½ by 6 in.

The standardization theme was carried on by Peter G. Bruck, of The Peoples Gas Light & Coke Co., Chicago, with a paper on "Standardization of Service and Riser."

The meeting was opened by J. M. Pickford, of Northern Indiana Public Service Co., Hammond, Ind., chairman of the distribution committee. W. C. Beckjord, president of Cincinnati Gas & Electric Co., extended a welcome to the city.

Four papers on use of copper pipe for services and mains attracted considerable attention at a Distribution Design and Development luncheon presided over by V. F. Bittner.

The motor vehicle committee was active under the chairmanship of F. M. Rudman, Michigan Consolidated. The committee held two morning conferences and three luncheons, in one of which the idea of defensive driving was emphasized, in connection with a paper by E. W. Jahn, of Consolidated Gas, Electric Light & Power Co., Baltimore, Md.

The corrosion committee, with Sidney E. Trouard of New Orleans Public Service Inc. as chairman, had a morning conference and two luncheon conferences, the topics including the cost of corrosion, instruments used in corrosion and cathodic protection work, and a panel discussion on hot-applied pipe coatings by technical representatives of several coating manufacturers.

"Meters and Metering," with R. J. Ott of the Philadelphia Gas Works Co. as chairman, were discussed at two well-attended luncheons, with emphasis on standardization of meters, mechanical opening machines, house regulators, meter setting practices and other topics.

The Construction and Maintenance Luncheon on Monday, with F. J. Hall, Michigan Consolidated, as chairman, in addition to discussion of many new kinds of equipment, heard a talk by Frank Sisca of Rochester (N.Y.) Gas & Electric Corp. on "Radio Dispatching and Use."

R. B. Barger of Hartford (Conn.) Gas Co. was chairman of Work on Consumers' Premises luncheons, at which a panel discussion of space heating light-ups and cleaning was the opening feature the first day, and chimney liner practices and radio dispatching and use occupied the spotlight the second day.

Pittsburgh Lures 300

Nearly 300 sales and promotion representatives of the gas utility and gas appliance companies gathered in Pittsburgh March 14-15 for the Eastern Natural Gas Regional Sales Conference.

Ray Little

A galaxy of men and women prominent in the industry spoke on a variety of subjects of interest to the sales and promotion executives present; keynote speaker of the conference was Robert W. Hendee, AGA president and president of the Colorado Interstate Gas Co., who told the meeting of his plans to sell the association and the industry to the public during his tenure.

Other speakers included Marvin Smith of the Muncie Gear Works, who discussed gas heat pumps; C. C. Young, The Gas Service Co., speaking on the possibilities of shaving peak loads offered by the new combination gas and oil burner; Prof. Erwin H. Schell, of MIT, on business and government regulation problems faced by the industry; GAMA President Frank J. Nugent; C. H. Rippe, Hamilton Manufacturing Co.; Dr. A. W. Gauger, Pennsylvania State College; Ira J. Rapson, Michigan Consolidated Gas Co.; Frank H. Steining, Servel Inc.; James F. Howley, Brooklyn Union Gas Co.; W. S. Redpath, Ketchum, McLeod & Grove advertising agency; H. P. Morehouse, Public Service Electric & Gas Co.; Jessie McQueen, home service counselor, AGA; and the Misses Lois Dineen and Caroline Evans, home service specialists of the Equitable Gas Co.

Raymond Little, Equitable Gas Co., was chairman of the conference.

Canvassers Wanted

The 18th Mid-West Regional Gas Sales Conference drew more than 450 gas industry sales executives to its March 28-30 sessions in Chicago. Delegates were welcomed by Chairman W. L. Hayes, general sales manager, Montana-Dakota Utilities Co., Minneapolis, whose opening speech stressed the necessity of gathering a well-trained force of "doorbell ringers and house-to-house canvassers."

The three-day conference was closed by a speech given by Dr. Kenneth McFarland, Topeka, Kan., superintendent of schools, who emphasized the dangers implicit in excessively bureaucratic government.

The AGA sent F. W. Williams to give a brief survey of the association's recent and planned action. Other speakers included: Dr. Clark G. Kuebler, president, Ripon College, Wisconsin; Stanley C. Gorman, sales promotion director of GAMA's water heater division; C. C. Young, research engineer, The Gas Service Co., Kansas City; Louis Ruthenberg, president, Servel Inc.; Henry W. Person, Mutual Life Insurance Co.; I. S. Anoff, president, Albert Pick Co., Chicago; Carl V. Haecker, Butler Bros., Chicago; Harold E. Jalass, vice president, Cribben & Sexton Co.; Howard D. White, executive vice president, LPGA; and Eleanor M. Morrison and Harriette Lundberg of Michigan Consolidated Gas Co. and Mary N. Hall of Elizabethtown.

Elected as chairman of the conference for the coming year was Ray J. Vandergriff, sales manager, Laclede Gas Light Co., St. Louis. J. E. Walsh, sales manager, Metropolitan Utilities District of Omaha, was elected assistant chairman.

Domestic Research

A large segment of the research brains of the gas industry gathered at the Statler hotel in Cleveland, March 31 and April 1, for the AGA's Domestic Research and Utilization Conference. Attendance was well over 300.

Some of the latest schemes of the electric competition were examined by speakers and plans were studied for improving the lead of gas.

In a luncheon address prepared by J. French Robinson, president of The East Ohio Gas Co. and read in Mr. Robinson's absence by Karl Emmerling, general sales manager of East Ohio, it was pointed out that:

"Tighter houses, smaller houses, basementless houses, all create new problems on ventilation, venting and air supply, and these same problems are common to all the appliances in the house. Therefore our problems of design, installation and servicing are becoming more and more common to all types of appliances. The gas range manufacturer can no longer disregard, say, the problems of the water heater manufacturer, as many of them are the same. It is becoming more and more apparent that manufacturers of gas appliances, regardless of type, must work together if the utmost in quality and efficiency is to be attained. One weak link in this chain may hurt everyone."

Mr. Robinson noted with satisfaction that several domestic research projects now under way are really fundamental in nature and declared that there should be more of this type of research "if the gas industry wants to hold the predominant position that it now has in domestic business."

He mentioned, as worthy of much study, such matters as new methods of combustion, new and different methods of transferring heat, simpler and more direct means of ignition, and new cooking machines.

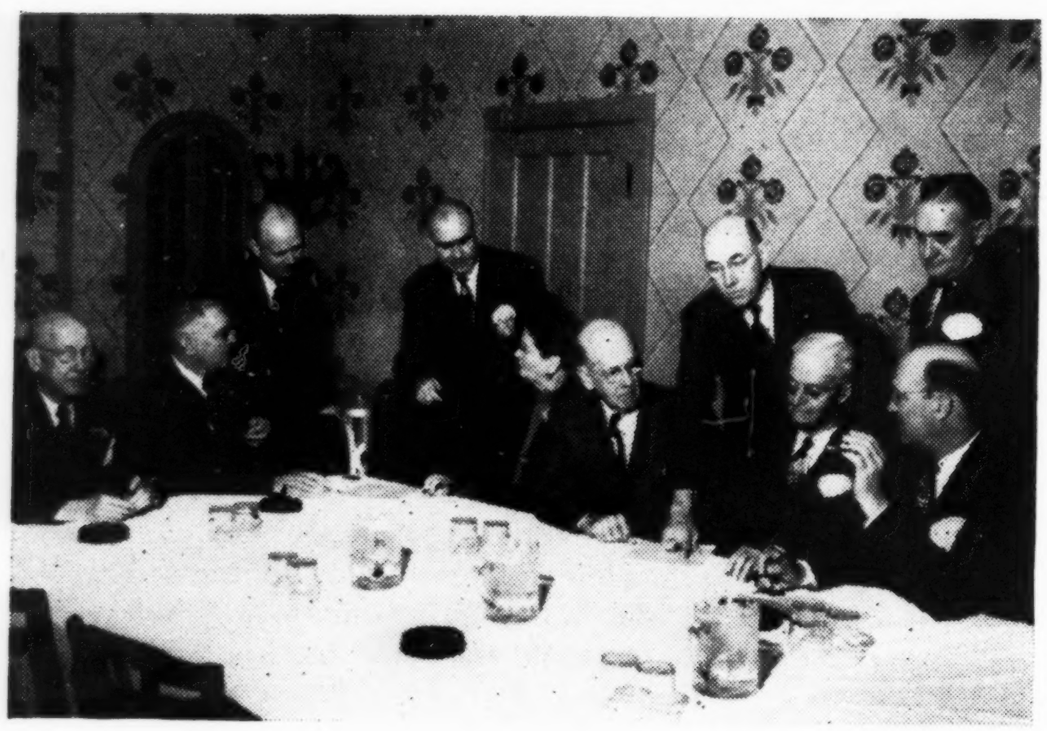
The vital necessity of competition in the

CONVENTION CIRCUIT

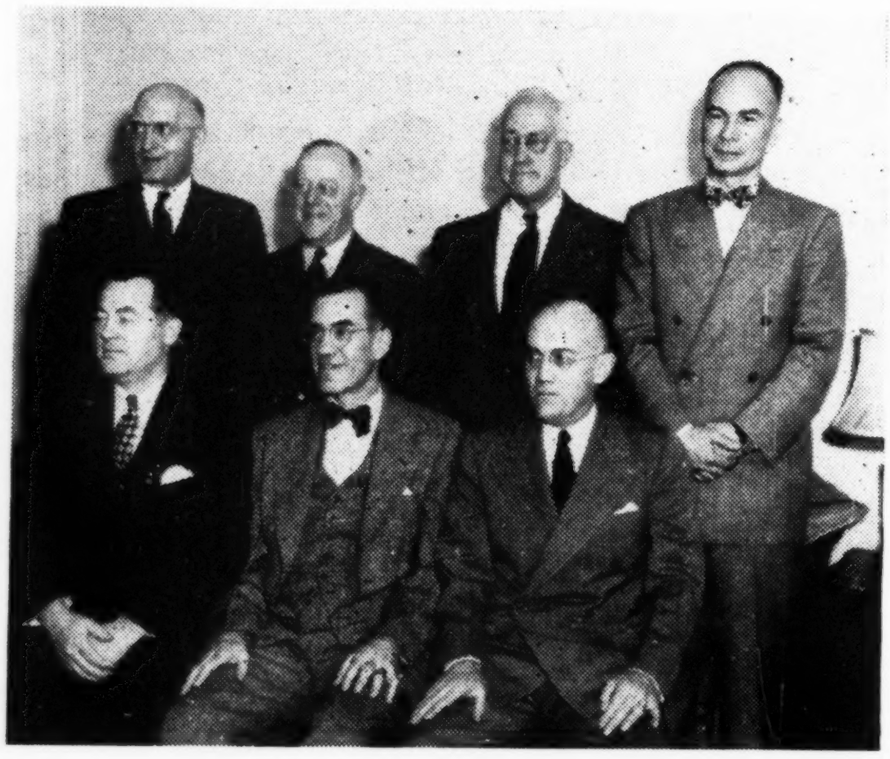
Harold E. Jalass of Cribben and Sexton waxes enthusiastic at Midwest Regional Gas Sales meeting.

Presentation was made to J. D. von Maur, conference founder, at the 25th annual Distribution, Corrosion, and Motor Vehicle meeting. At left are W. E. Kemen, Milwaukee (Wis.) Gas Co.; H. P. Boncher, Dresser Mfg. Division, and Mr. von Maur.

Nashville's Mayor T. L. Cummings (left in photo above), official greeter, welcomes Lone Star Gas Co.'s D. A. Hulcy to industrial and commercial meeting as D. W. Reeves, sectional chairman from Oklahoma Natural, looks on.



At annual Oklahoma Utilities Assn. meeting (above). Seated, F. B. Long, J. Y. Wheeler, ex-presidents; Kate Niblack, secretary; L. A. Robertson, S. I. McElhoes, A. F. Potter, directors. Standing, D. W. Reeves, 1st vice pres.; Malcolm Morrison, pres.; W. L. Woodward and C. B. Day, directors.



New officers of New England Gas Assn. Seated, E. H. Eacker, Boston, pres.; E. G. Twohey, Worcester, ex-pres.; J. A. Hiller, Portland, 1st vice pres. Standing, J. A. Cook, Lynn, nominating committee head; Otto Price, Boston, treas.; G. G. Howie, Cambridge, 2nd vice; Clark Belden, clerk.

American way of life, combined with the fact that the gas industry must be on its toes to meet the various competitive forces, was the theme of another luncheon speaker, Frank J. Nugent, president of the Gas Appliance Manufacturers Assn.

Mr. Nugent mentioned the electric industry as a dynamic competitive force as well as the oil industry, and healthy competition among the gas appliance manufacturers themselves.

He also stressed the necessity of keeping an eye on specifications developed by various official bodies. He warned that the gas industry must be on its guard lest specifications are established that will be more easily met by competitive fuels. He mentioned particularly the fact that restrictions affecting gas are three to one as compared with electricity.

According to H. Vinton Potter, co-ordinator of promotion of the AGA, another luncheon speaker, the hasty transition from a sellers' to a buyers' market has meant that "many of us have been caught with our plans down."

He made the following six suggestions to manufacturers:

1. Improve the appearance of present appliances.
2. Develop new appliances.
3. Develop more flexibility and interchangeability.
4. Take advantage of AGA research and then do a lot more as individuals.
5. More standardization of dimensions.
6. Stress the importance of the AGA seal.

C. George Segeler, engineer of utilization of the AGA, discussing rules and ordinances affecting the use of gas, pointed out that codes which have been unchanged for 10 or 20 years are out of date today.

R. J. Rutherford, vice president, Worcester (Mass.) Gas Light Co., as chairman of the committee on domestic gas research, opened the conference.

Edwin L. Hall, director of AGA Testing Laboratories, reviewed postwar revisions in AGA approval requirements.

E. C. Adams, of Adams Brothers Manufacturing Co., who discussed venting problems and practices, said that while formerly it was thought that most down-drafts were caused by outside conditions, it had now been found that to a considerable extent they were caused by insufficient pressure at the bottom of the vent. Mr. Adams expressed the belief that builders should be influenced to engineer an entrance of outside air in certain types of homes.

Eck Heads Mid-West

Featuring symposiums led by men prominent in the gas industry and a number of interesting and informative speeches, the Mid-West Gas Assn. held its annual meeting and convention at Des Moines, Iowa, April 11-13. It was the 44th annual gathering for the group.

These new officers were elected: L. J. Eck, Minneapolis (Minn.) Gas Co., pres.; D. J. Reimers, Minnesota Valley Natural Gas Co., St. Peter, 1st v.p.; R. B. Searing, Sioux City (Iowa) Gas & Electric Co., 2nd v.p.; H. E. Peckham, Northern States Power Co., St. Paul, Minn., was re-elected sec.-treas. Members of the executive council for the 1949-1952 term are Marshall Cook, Phillips Petroleum Co., Des Moines; John F. Merriam, Northern

A. C. Rathkey

L. J. Eck

Natural Gas Co., Omaha, Neb.; J. C. Clarke, Northern States Power Co., Fargo, N. D.; and A L. McKenzie, Iowa-Illinois Gas & Electric Co., Cedar Rapids, Iowa.

Speakers at the gathering, held at the Hotel Fort Des Moines, included Arnold C. Rathkey, Iowa Power & Light Co., Waterloo, past president; Robert W. Hendee, AGA president; Col. Willard F. Rockwell, chairman of the board, Rockwell Manufacturing Co., Pittsburgh; H. Leigh Whitelaw, GAMA managing director; and Gideon Seymour, vice president and executive editor, *Minneapolis (Minn.) Star and Tribune*, who spoke on "The Atom and Us." The rest of the program featured consistently fine speakers who presented talks dealing with many aspects of the industry, including technical aids and sales-boosting.

Calendar

May

National Conference of State Utility Commission Engineers—Skirvin hotel, Oklahoma City, May 4-6.

AGA Natural Gas Department Spring Meeting—French Lick Springs, Ind., May 9-10.

Interstate Oil Compact Commission Spring Meeting—Jacksonville, Fla., May 9-11.

LPGA Annual Convention—Palmer House, Chicago, May 9-11.

AGA Industrial Gas School—Hotel Severin, Indianapolis, Ind., May 9-13.

AGA Executive Conference—Netherlands Plaza hotel, Cincinnati, May 12-13.

National Fire Protection Assn.—Fairmont hotel, San Francisco, May 16-19.

Pennsylvania Gas Assn. Annual Convention—Galen Hall, Wernersville, May 17-19.

New Jersey Utilities Assn. Spring Meeting—Seaview Country Club, Absecon, N. J., May 20.

AGA Production & Chemical Conference—Hotel New Yorker, New York, N. Y., May 23-25.

National Restaurant Exposition—Atlantic City, N. J., May 24-27.

Pacific Coast Domestic Research and Utilization Conference—Ambassador hotel, Los Angeles, May 26-27.

The Natural Gas & Petroleum Assn. of Canada Annual Meeting—Hotel London, London, Ont., May 26-27.

Fourth Annual Short Course in Gas Technology—Texas College of Arts & Industries, Kingsville, May 30-June 1.

National Assn. of Master Plumbers—Annual Convention & Home Comfort Exposition, Cleveland Public auditorium, Cleveland, Ohio, May 30-June 2.

June

New England Gas Assn. Operating Division—Hotel Kimball, Springfield, Mass., June 2.

Midwest Industrial Gas Council—Moraine hotel, Highland Park, Ill., June 2-3.

Canadian Gas Assn. Annual Convention—Bigwin Inn, Lake of Bays, Ontario, June 16-20.

New York-New Jersey Regional Gas Sales Conference—Essex & Sussex hotel, Spring Lake, N. J., June 20-21.

Michigan Gas Assn. Annual Convention—Grand hotel, Mackinac Island, Mich., June 24-25.

August

National Assn. of Railroad & Utilities Commissioners—Hotel Cleveland, Cleveland, Ohio, Aug. 7.

September

Pacific Coast Gas Assn. Annual Convention—Santa Barbara, Calif., Sept. 7-9.

New Jersey Gas Assn.—Monmouth hotel, Spring Lake, N. J., Sept. 9.

The Maryland Utilities Assn. Fall Conference—Cavalier hotel, Virginia Beach, Va., Sept. 16-17.

National Butane-Propane Assn.—Jefferson hotel, St. Louis, Sept. 19-21.

October

American Standards Assn. Annual Meeting—Waldorf Astoria hotel, New York, Oct. 11-14.

Texas Mid-Continent Oil & Gas Assn. Annual Meeting—Rice hotel, Houston, Oct. 13-14.

American Gas Assn. Annual Convention—Chicago, Oct. 17-20.

National Safety Congress—Morrison hotel, Chicago, Oct. 24-28.

November

American Society of Mechanical Engineers Annual Meeting—New York, N. Y., Nov. 27-Dec. 2.

ASSOCIATIONS

GAMA Aims High

Close coordination planned; Hobson elected president

GAMA was pretty high for its 14th annual meeting last month.

In the first place, its members convened at the beautiful Broadmoor in Colorado Springs, Colo., which is 6000 ft above sea level.

Secondly, its membership turnout was just about tops, with well over 250 showing up for the April 5-7 meeting.

And finally, sights were set high for the coming competitive struggle to maintain gas appliance volume and quality leadership.

The arrival of the buyers market in appliances was officially recognized at the convention, keynoting several of the main addresses and pervading the extra-curricular conversations of many of the delegates. After some three years or so of waiting for it, they concluded that the industry's position is strong and that with renewed efforts and a continuation of industry-wide promotional campaigns it can be strengthened more.

Hugh H. Cuthrell, vice president of both the AGA and Brooklyn Union Gas Co., one of the headline speakers, wrapped the situation up in an eight-part prescription for achieving competitive goals:

1. Constant improvement of equipment, both mechanical and design.
2. More effective use of AGA research.
3. Greater capitalization on customer acceptance of the AGA seal of approval.
4. More effective dealer programs.
5. Better trained dealers.
6. More effective ways of reaching the mass building market.
7. Replacing equipment in strategic show places.
8. More effective advertising in greater volume.

Frank J. Nugent, Bryant Heater Co., who yields his presidential gavel to Stanley H. Hobson, Geo. D. Roper Corp. president, this year, took the same line. A "unified and consolidated sales front to stimulate consumer education and increase the use and sale of gas appliances and equipment" is needed to carry the fight, he said. Along with brand name identification, he felt that promotional efforts should stress the fuel and the industry.

Other top general session speakers whose topics were of a business nature include George H. Richards, counsel, whose "Few Legal Points" dealt specifically with taxes, legality of the basing point system, and quantity discounts—his slants on court decisions were particularly revealing; Charles C. Warwick, GAMA traffic committee chairman from Rheem, whose "You Pay the Freight" was both amusing and informative in detailing freight problems and the committee's work in assuring fair treatment; and R. T. Killian, Bryant, marketing committee chairman, whose "Broad Aspects of Marketing" was a revelation of association techniques in aiding market planning.

New general association officers elected at the meeting in addition to Mr. Hobson include Frederic O. Hess, Selas Corp., first vice president; Louis Ruthenburg, president of Servel, second vice president; and John Van Norden, American Meter Co., succeeding himself as treasurer. H. Leigh Whitelaw, managing director, continues as secretary of the board of directors.

Groups which met in special sessions each morning of the convention elected the following:

Gas Floor Furnace Group—Lee Brand, Empire Stove, chairman; R. O. Montrief, Ward Heater, vice chairman; Bradford Corbin, Coleman Co., executive committeeman.

Gas Furnace Group—Roger Booth, Lennox Furnace, chairman; R. E. Cook, Thatcher Furnace, vice chairman; Keith Davis, Bryant Heater, executive committee.

Industrial Division—Alvin Stock, Partlow Corp., chairman; D. A. Campbell, Bryant, vice chairman; Herman Gehnrich, Gehnrich & Gehnrich, executive.

Conversion Burner Group—J. V. Rerucha, Columbia Burner, chairman; F. A. Furlong, Autogas Corp., vice chairman; E. A. Norman Jr., Norman Products, executive.

Valve Division—P. S. Harper, Harper-Wyman, chairman; E. S. Stuckenholt, W. S. Schoenberger Co., vice chairman; H. A. Watson, Lincoln Brass Works, executive.

Controls and Related Accessories Division—J. F. Ray, General Controls, chairman; R. S. Penn, Penn Electric Switch, vice chairman; Howard Dyer, Domestic Thermostat, executive.

Gas House Heating and Air Conditioning Division—I. E. Seith, Forest City Foundries, chairman; Harry Gurney, Surface Combustion, vice chairman; F. L. Meyer, Meyer Furnace, executive.

Gas Boiler Group—H. C. Day, American-Standard, chairman; J. Crawford, Bryant Heater, vice chairman; H. L. Hewitt Jr., L. J. Mueller Furnace Co., executive.

CP Manufacturers Group—Harold Jalass, Cribben & Sexton, chairman; Henry Honer, Western Stove, vice chairman.

Direct Heating Equipment Division—L. O. Reese, Armstrong Products, chairman; F. D. Hart, Tennessee Enamel Manufacturing, vice chairman; R. F. Cleary, Strait & Richards, A. S. Martinson, Hammel Radiator; G. H. McFadden, Ohio Foundry & Manufacturing, executive committeemen.

Record NEGA Turnout Elects Eacker

The Annual Business Conference of The New England Gas Assn. at Boston March 24 and 25 brought out another record registration of 644, and plenty of up-to-the-minute discussion on the expected coming of natural gas, the electric competition, and matters of public relations and labor relations that were on everyone's mind.

Attempting apparently to bare its teeth at the gas men, the electric utility took advantage of the occasion to splash full-page advertisements of an ambitious electric kitchen promotion program in the Boston papers. Free wiring on electric ranges was offered for a limited period.

The ads led to comments that the competition was flattering the gas industry by borrowing its stuff on all-out promotion. The juiciness of the plum which the gas industry's business would be for the electric companies was pointed out by William B. Hewson of Brooklyn Union. At the same time, Mr. Hewson expressed the belief that the gas industry could make its business an "indigestible plum," so that the electric crowd wouldn't be able to gobble it up. This can be accomplished by continued drumming in and repetition of the basic truths of the advantages of gas.

The following were elected officers for 1949-50:

Earl H. Eacker, president (president, Boston Consolidated Gas Co.); John A. Hiller, first vice president (sales manager, Portland Gas Co.); Gordon G. Howie, second vice president (vice president and general manager, Cambridge Gas Light Co.); James A. Cook, chairman, nominating committee (vice president and general manager, Lynn Gas and Electric Co.); Otto Price, treasurer (vice president, Boston Consolidated Gas Co.), and Clark Belden, clerk (executive secretary).

Showing the extent to which NEGA gets closely into the business lives of everyone in the gas industry in New England, Mr. Twohey pointed out that during the association year just ended, 32 division and group meetings were held, with a total of 3150 attendance. In addition there were many meetings of the board of directors, program committees, and other groups for which no attendance records were kept. It is probable that some NEGA group men discussed industry matters every week during the year, he said.

Mr. Twohey referred to the problem of net earnings in view of the fact that rising gross revenues have been accompanied by steadily increased costs of doing business. He said that the recent decision of the Massachusetts Supreme Court in the Lowell Gas Light Co. case (see report in "news" section) furnished grounds for expectation that Massachusetts gas companies may in the future be allowed earnings commensurate with the investment which they dedicate to the service of the public. This expectation was further strengthened by another recent decision of the same court in the Boston Consolidated Gas case.

Referring to new methods, Mr. Twohey discussed the two companies in New England which recently have increased the Btu content of their gas using essentially the same production plants. The company in Framingham, Mass., he pointed out, made an intermediate step to 660 Btu gas involving no plant investment, very little conversion expense, and resulting in 25 to 30% increase in both production and distribution capacity. He said that the extension of this method to Worcester was anticipated this summer.

The other company referred to was Cambridge, Mass. There they have gone all the way to 951 Btu with a method involving comparatively little capital investment, a substantial conversion expense, but resulting in an increase of about 80% in both production and distribution capacity.

In discussing the coming of natural gas, Mr. Twohey called attention to a recent statement by Federal Power Commissioner Olds that companies should plan for an efficient and economical combined service.

Mr. Twohey declared that if this should become the official attitude of the commission it would appear that the "conversion of existing New England plants to the production of high-Btu gas might not only take care of demands in the interim period, but might also place the companies in a good future position to meet these possible requirements of the Federal Power Commission."

Special presentations were made by Mr. Twohey to J. J. Quinn, Walter C. Slade and C. H. Ackerman, who, Mr. Twohey said, "seemed worthy of special mention because their records exemplify the finest kind of individual and personal association cooperation."

In his discussion of the association's year, Clark Belden, executive secretary of NEGA, reviewed the continuing growth in attendance and interest in the association's varied meetings and activities.

It was pointed out that for the first time the annual meeting program brought together the heads of the three major segments of the nationwide gas industry: Robert W. Hendee, president of the American Gas Assn.; Frank J. Nugent, president of the Gas Appliance Manufacturers Assn., and Captain E. S. Pettyjohn, director of the Institute of Gas Technology.

Mr. Nugent urged more aggressive appliance selling and discussed current problems and plans of manufacturers and outlined plans for cooperation.

Referring to the selling efforts of the electric competition, he said that it must be true that the electric industry is selling its products thoroughly since it is selling a product with a higher initial cost and a higher operating cost. In view of their larger advertising budgets, Mr. Nugent expressed the view that the electric industry will continue to sell and urged the necessity for strong and effective measures to meet this competition.

Other speakers at the meeting were Associate Prof. Myles L. Mace of Harvard Graduate School of Business Administration, who spoke on "Developing Men for Management"; E. P. Noppel, general consultant, Ebasco Services Inc., New York, who discussed "Energy Use and Supply Trends"; Erick Larson, of Ford, Bacon & Davis Inc., on "Natural Gas and New England"; Richard S. Meriam, professor of business economics, Harvard Graduate School of Business Administration, on "Public Relationships and Responsibilities"; H. William Doering, Springfield Gas Light Co., on "Selling Air Conditioning in New England"; C. George Segeler, engineer of utilization, AGA, who discussed the electric competition and its claims; and Olga P. Brucher, of Rhode Island State College, on "Home Economics Education Looks at Home Service."

OUA Hears Tax Warning

Several of the speakers at the 31st annual convention of the Oklahoma Utilities Assn. held at Tulsa March 17-18 pulled no punches when they warned delegates against complacency in the face of increasing taxes and pyramiding costs of government.

Joseph Bowes, president of the Oklahoma Natural Gas Co., Tulsa, declared that the most real danger threatening the nation is the possibility of its being taken over from within by collectivists or communists. "Nearly every day a bill to increase taxes is introduced in the Oklahoma legislature, including proposals to make additional special levies on the production and sale of natural gas and gasoline." He also cited a bill which would authorize the corporation commission to fix the field price of natural gas and branded it as "a step toward socialism."

Other speakers who criticized the government's wasteful tendencies, mounting public debts, and legislation by blocs included: Steve Stahl, Oklahoma Public Expenditures Council, Oklahoma City; Edwin Vennard, engineer consultant, Chicago, and J. A. Whitlow, Public Service Co. of Oklahoma, Tulsa. Dr. David L. MacFarlane, president of the State Teachers College, Emporia, Kan., the banquet speaker, discussed "The American Heritage."

Further comment on the American scene was given in speeches made by George A. Davis, president of the Oklahoma Gas & Electric Co., Oklahoma City; J. Y. Wheeler, recently retired Lone Star Gas Co. executive from Ardmore, and R. V. Peterson, associate publisher of the *Norman Transcript,* Norman.

Gas and electric divisions of the association elected the following chairmen: Gas div., Richard W. Camp, vice president and chief geologist, Consolidated Gas Utilities Corp., Oklahoma City; electric div., T. P. Tuepker, director of public affairs, Public Service Co. of Oklahoma, Tulsa.

Gas Course Transferred

The home study course on natural gas that has been conducted under the auspices of the University of Kansas for more than 15 years has been discontinued. Dean F. T. Stockton announced with regret that increasing demands on the time of faculty members was a major reason for the step. The AGA's personnel committee has arranged with the Institute of Gas Technology in Chicago to conduct a home study course similar to the one abandoned by Kansas. IIT's home study course will be under the auspices of the AGA and under the general supervision of an advisory committee of AGA members and IIT trustees. Three courses will be offered when present plans materialize: natural gas, including transmission; manufactured gas; and distribution and utilization.

T. J. Strickler

Plans for the original home study course were initiated in the early 1930's, with Major T. J. Strickler of Kansas City, former president of AGA, recommending the University of Kansas. The university's extension director arranged for the course's presentation and the services of Prof. C. M. Young, head of the department of mining engineering, who prepared and conducted the course.

Penn Gasmen to Meet

Wernersville, Pa., some 10 miles west of Reading, will be the scene of the 41st annual meeting of the Pennsylvania Gas Assn. from the 17th to the 19th of this month. Sessions will be held at the southeastern Pennsylvania town's Garden Hall.

Following a business meeting on the first day of the meeting, at which time Robert W. Hendee, AGA president, and Hugh H. Cuthrell, vice president of that group will speak. The speakers program has been scheduled as follows: May 16, *Production,* with speeches on "Catalytic Cracking Plants for Peak and Base Load Gas Production," and "Pennsylvania State Sanitary Water Board's Requirements for the Treatment of Gas Works Waste Waters"; *Distribution,* "Mechanized Equipment Used in Gas Distribution Activities," and "Dust from New Haven"; *Accounting,* "Principles of Job Evaluation," and "Employee Performance Rating"; May 19, *Customer and Employee Relations,* "Our Employee Relations — Today and Tomorrow" (L. A. Brandt, the Peoples Gas Light & Coke Co.), "Eat Your Spinach and Like It"; *Sales Promotion,* "Water Heaters Galore," and "Operation Brooklyn."

Presiding at the various sessions will be J. L. Harrison, H. W. Parker, E. N. Keller, H. R. Flanegan, and H. R. Zeamer.

Great Lakes Confab

The AGA Great Lakes Personnel Conference held a successful session March 11 in Chicago with the featured speaker, Dr. Raleigh Stone, delivering a highly interesting address on the expansion of employee benefit plans. In the light of facts presented in his talk, Dr. Stone concluded that any expansion of such plans should be on a contributing basis.

New officers were elected as follows: Eugene L. Ramsey, assistant vice president, The Laclede Gas Light Co., chairman; Tom Hayes, director of personnel and public relations, Milwaukee Gas Light Co., vice chairman; and E. W. Christell, training supervisor, The Peoples Gas Light & Coke Co., secretary.

The conference voted to join with the other two regional personnel conferences and the personnel committee of the AGA in sponsoring the 4th annual National Personnel Conference next November, and also agreed that the next meeting of the group would be in Chicago next June.

Talented Faculty

Engineers from seven states will be instructors at the 4th annual short course in gas technology at Texas A&I College, Kingsville, Texas, May 30, 31, and June 1. Sponsored by the Southern Gas Assn., the course brings each year about 200 industrialists and engineers to the A&I campus.

Gas conservation practices and the growing importance of gas technology will be stressed, according to Dr. Frank H. Dotterweich, administrative committee chairman. Two sections of study will be offered—"Latest Methods of Solving Important Problems of Production and Transmission" and "Improved Techniques in the Utilization of Natural Gas."

Gas men appearing on the production and transmission program will include Dr. Joseph Parent, Institute of Gas Technology, Chicago; B. T. Mast, Tennessee Gas Transmission Co., Houston; Dr. D. A. Shock, University of Texas, Austin; and Robert M. Hutchison, Houston Natural Gas Corp.

In the utilization section are D. M. Baker, Oklahoma Natural Gas Co., Tulsa; Walter F. Friend, Ebasco Services Inc., New York; H. Charles Pierce, Servel Inc., Evansville.

EXPANSION

Natural Sought

Plans for obtaining natural gas to be distributed through the Eastern Arkansas Natural Gas Consumers Assn. to 27 cities and towns were announced in late March by Mayor Ben F. Butler of Osceola, Ark., president of the association.

The group, which has sought for several years to obtain a source of gas supply to serve franchises which it holds, expects to secure gas from one of two sources. Natural gas will be used to generate electricity in the new $15 million power plant of the Arkansas Power and Light Co., which is under construction near Forrest City, Ark., and will also be used as the principal fuel in the new plant of the Arkansas-Missouri Power Co. near Campbell, Mo. Negotiations looking toward contracts with gas suppliers for one or both of the two plants are under way, and Mayor Butler expressed belief that a contract will be secured for delivery of natural gas to the large eastern Arkansas area within two years.

The Arkansas legislature, in a recent session, passed an act enabling cities and towns to issue revenue bonds after voters have approved such proposals in special elections.

Customers by the Gross

The Lone Star Gas Co., Dallas, added 38,359 new customers during 1948 and expects to keep adding new customers during 1949 at the same rate, according to D. A. Hulcy, president. In the company's annual report Mr. Hulcy stated, "There has been no slackening whatever in the requirements for additional gas service."

Lone Star plans to make "further substantial additions" to its facilities to keep up with the demand for its product and services. The company had a net income in 1948 of almost $12½ million; 1947's net was slightly more than $10¼ million. Net additions to property in 1948 amounted to more than $20 million.

A wholly-owned subsidiary, Lone Star Producing Co., has interests in a large number of gas reserves, in addition to those owned by the company itself; supply will not be a problem for many years to come.

N.Y. PSC Curbs Sales

The Rochester (N.Y.) Gas & Electric Corp. has some 7000 orders on hand for gas heating plants which it can't service because the N.Y. Public Service Commission hasn't permitted the company to buy as much natural gas as suppliers of the gas have been both willing and able to furnish, according to the utility's annual report.

The report, signed by Herman Russell, chairman of the board of directors, and Alexander M. Beebee, president, says:

"This situation not only restricts sales of natural gas, but limits gas output in the company's manufactured gas territory, because natural gas is used to enrich manufactured gas produced by the company. Every effort has been made to obtain a modification of an order of the Public Service Commission so that less restricted sales of gas for house heating can begin this spring."

GCS Enlarges Offices

Branch offices of the Gas Consumer Service in Chicago and San Francisco are now in larger quarters as the result of a twin move.

New address in Chicago is 900 S. Wabash Ave., Chicago 5, where the firm occupies a 7-story building. In San Francisco the company has moved to its own building, located at 956 Folsom St., San Francisco 7. Available floor space was doubled in each case.

Construction Okay Asked

Two subsidiaries of Columbia Gas System Inc.—Home Gas Co. and Eastern Pipe Line Co.—have asked the FPC to authorize the construction, retirement, and sale of natural gas facilities in New Jersey and New York, in a joint application.

Cost of the entire project has been estimated at nearly $2½ million.

FINANCIAL

Rate Roundup

Ernest R. Acker, EEI president, said recently that requests by electric utilities for rate boosts have reached a peak and are expected to taper off from now on. He made his statement as the industry finds itself in the middle of a $9 billion expansion program which will raise its kilowatt capacity 50% to 75 million. Gas rates around the nation are still fluctuating, but the general trend continues higher. In Chicago, James F. Oates Jr., chairman of Peoples Gas, Light & Coke Co., called for higher rates on gas for heating homes, stating that gas now costs the heating customer much less than oil or a good grade of coal, in many cases.

Here's the rate picture for the past month.

Consumers Power Co., Jackson, Mich., had modified a temporary boost given it last August by the state public service commission. The company had asked for an increase of $4.8 million a year; it received an overall permanent increase of $1.8 million, supplanting a surcharge assessed against heavy customers.

Net earnings for the company last year were $1.5 million, giving a 3.5% yield on investment. The new rate will produce approximately 6.5%.

Binghamton (N.Y.) Gas Works announced that it has asked the New York State Public Service Commission for permission to boost the rate of gas used in heating homes.

If approved, the new rate would become effective May 1. The PSC has not indicated when it will act on the request, nor whether hearings will be held, the company said.

Robert E. Williams, district manager of the gas works, cited, for example, the case of a customer who now pays a heating bill of $108 a year. Under the new rate, he said, this bill would be boosted to about $123 a year—an increase of $15.

Tampa (Fla.) Gas Co.'s sliding rate scale, based on the price of bulk oil, lowered the bills of many Tampa customers in March. Fuel costs per Mcf of gas consumed in November were 26 cents. In March the charges were reduced to 20 cents.

Iroquois Gas Corp., Buffalo, N. Y., has renewed its request to the Public Service Commission for permission to increase gas rates approximately 22%. The proposed rates would take the place of the present "interim" rates which went into effect on Dec. 17 and which will expire Aug. 31.

The interim rates provide only about half the amount Iroquois originally sought when it asked for authority to increase rates last May.

Michigan Consolidated Gas Co., Detroit, and Detroit Edison Co. recently received rate boosts amounting to $20 million from the Michigan Public Service Commission and thus stirred up a major tempest among members of the Detroit city council. The City of Detroit has appealed the rate increase in county circuit court, claiming it is unjustified.

Stewart B. White and Henry L. Woolfenden, PSC chairman and member, attended a council meeting to explain the PSC's policy after Council President George Edwards had charged that the PSC was biased and unfair and that the members were constantly "tumbling over themselves to favor utilities." Mr. White, the commission chairman, refused to discuss "controversial matters" and insisted that the discussion be limited to the procedures followed by the commission. During the meeting of Councilman L. C. Miriani, who had proposed that the city drop the appeals, engaged in verbal jousting with James H. Lee, assistant corporation counsel, who maintained that "the whole situation is slanted against the public."

Mr. White explained that his group tried to steer a fair middle course between giving okays to every request that came along and still not refusing to see the need for any increase. Detroit Edison had asked for $13 mil-

Ebasco Boosts GAS

Ebasco Services Inc.'s monthly publication, *Ebasco News Items,* made mention in February of the special July issue of *GAS,* the big — more than 200 pages — issue which will be devoted to safety in the gas utility and appliance industries.

News Items gave a brief outline of the Safety Issue's contents, and offered to handle orders for its readers. The July issue will graphically present operations in every phase of the industry: Driver's Manual, Safety on the Pipeline, Customer Service, Meter Testing Procedure, Special Tools for Safe Handling, etc.—a comprehensive survey of up-to-date safety techniques.

Quantities of the Safety Issue can be ordered in advance of publication from *GAS,* 198 S. Alvarado, Los Angeles 4, Calif., at $1 a copy. The post-publication price will be $2 a copy.

lion and received $5 million last July and the remainder last January; Michigan Consolidated wanted $12 million and was given $7 million in January.

Natural Sales Increase

The steady increase in the use of natural gas is shown clearly in February figures on the sales of gas utilities to ultimate consumers, reported by the AGA. The second month of the year brought a therm sale increase of 5.2% over last February; the total was 3,517,414,000.

The 12-month total at the end of February was 33,003,301,000 therms, a 9.1% gain over the previous period. On Feb. 28, 1949, the AGA's index of gas sales stood at 246.4% of the 1935-39 average.

Natural gas sales in February jumped 9.1% over the February, 1948, total, adding up to 3,160,406,000 therms. The 12-month total was 29,562,068,000 therms, an 11.9% increase.

Manufactured gas sales dropped 13.7% for the month of February as compared to the same month in 1948. Mixed gas sales decreased 29.4% for the same period. This year's February sales for these two classifications were 125,280,000 therms for mixed, 231,728,000 therms for manufactured.

Texas Trade

"Horse-trading" in Corpus Christi, Texas, in late March resulted in a switch of ownership of gas lines between the city and the Houston Natural Gas Corp.

The city council approved a contract whereby the affected city lines were conveyed to Houston Natural in return for an equal number of the company's lines. The balance of the company lines being taken over by the city will be paid for by five promissory notes amounting to $141,099.24.

Income from the gas system will be used to pay off the notes in five equal installments.

Financial Roundup

Financial reports of gas utilities and gas appliance companies around the nation reveal that in many cases upped income has been more than offset by higher expenses, the result being a lower earning per common share.

United Gas Improvement Co. reports a company income of $1.52 per share, compared with $1.83 in 1947. In both 1948 and 1947 there was substantial income of a non-recurring nature: 15 cents a share last year, and 54 cents a share in 1947.

A new UGI subsidiary, Lancaster County Gas Co., was incorporated Jan. 20 of this year, the parent company acquiring all of its common stock—$2.5 million. Lancaster operations began March 1, the company having acquired all of the property and franchises of Pennsylvania Power & Light Co. relating to the manufacture and distribution of gas in Lancaster county, Pa. The Harrisburg Gas Co. acquired similar facilities in the Carlisle area of Cumberland county, Pa.

Harrisburg Gas and Consumers Gas Co. (Reading, Pa.), UGI subsidiaries, now have a catalytic cracking plant for peak load use, according to the report, and the Allentown-Bethlehem Gas Co. has one in construction.

Philadelphia Gas Works, operated through a subsidiary, had operating revenue of more than $31 million. It is now receiving quantities of natural through the Inch lines, using them in its manufacturing processes. Philly Gas Works spent more than $6 million in 1948 for plant facilities expansion.

Laclede Gas Light Co., St. Louis, earned 90 cents per share in 1948, a good step up from 1947's 82 cents average. Operating revenue for Laclede was $15,340,340, a 7.5% increase over 1947's figure and a new high level. Operating expenses increased 7.6%.

At the end of the year the company had nearly 300,000 customers; the increase (6249 new customers) was accomplished despite the bar on new space heating customers. The volume of gas sales jumped 8.6% over 1947. Average gas consumption for cooking, refrigeration, and water heating has gone up 35% since 1943.

Consolidated Natural Gas Co., New York, had total operating revenues of approximately $103 million during 1948, a $9 million increase over 1947's figure, but net income shrank some $2.5 million from the 1947 total of $14.7 million. Earnings per common share dropped from $4.51 to $3.75.

Contributing to this situation were a 20% rise in purchased gas cost and a 17% jump in payroll costs.

Frank H. Lerch Jr., Con Natural president, stated that the picture should improve after 1949; the last three years have been heavy with pipeline and compressor station costs and it is expected these expenses will drop down to normal after the current year. He further said, "As our gas suppliers are able to increase their deliveries of gas to our companies, additional house heating customers, our largest potential market, will be added . . . our net income should improve."

Con Natural spent about $28.9 million during 1948; 1949 expenditures are estimated at $25.7 million. Total gas sales were 213,039,000 Mcf, a 9% increase over 1947. The company added 20,000 customers in 1948.

Detroit-Michigan Stove Co. had net sales of almost $21 million during the past year; sales were up $242,976 over 1947. Net income dropped about $500,000 however, the average per common stock share after preferred dividends sinking from $2.52 to $2.01.

President John A. Fry said that the company was in a "stronger financial condition than ever before" despite a decreased volume of sales in 1948's last quarter. He added that costs are being reduced.

GAS PRODUCTION

Gas from Wood Waste

Development of a method of producing domestic gas from wood waste in British Columbia is now being studied jointly by the B. C. Research Council and the B. C. Electric Co., according to the Hon. L. H. Eyres, British Columbia Minister of Trade and Industry. Mr. Eyres said:

"Experiments in the gas production project, financed by a $5000 contribution from the

CON EDISON
would be neglecting your interests
if we didn't tell you this:
A Strike at Con Edison
CAN BE
AVOIDED!
Con Edison offers to settle all disputes on the same
basis that worked so peaceably in 1947 and 1948.
WE OFFER AGAIN . . . in 1949
A STRIKE VOTE
HAS BEEN TAKEN
at Consolidated Edison
The public
comes first
To avoid any stoppage of service, once again we have offered to arbitrate wage questions. On other matters we've offered either to negotiate changes or to continue the present contract for the coming year, thus letting employees retain all present benefits.
BY WORKING THINGS OUT TOGETHER WE'VE NEVER HAD A STRIKE
CONSOLIDATED EDISON
SYSTEM COMPANIES

Selling the Public

These four advertisements were published in New York City daily newspapers during and after the crucial period in March when employees of Consolidated Edison nearly went on strike.

The bottom three were run when the strike was threatened. They detailed the company's offers of arbitration and the general wage and working condition setup which the union and the company had found mutually advantageous through the past few years. The ads noted how past disputes had been amicably settled through arbitration, and expressed regret that labor chiefs were not taking advantage of this system in the current dispute. The company's principles and past record were clearly detailed to the New York public.

The top ad was released a few days after the strike call had been cancelled and was related to the company's need for higher electric rates. It told of the company's tremendous $435 million expansion program and of its responsibility to its 155,000 stockholders.

These eye-stopping ads, giving views too often overlooked by the public's mind, are good examples of how public relations-advertising can be used to effect.

B. C. Electric and an equal amount provided by the Research Council, have resulted in development of a process for producing a gas with a thermal value of over 450 Btu's from waste wood.

"A small pilot unit is now under construction to obtain basic data for the construction of a large scale commercial plant."

Thermal value of 450 Btu/cu ft given for the wood-waste gas, is the same as that for some domestic gases manufactured from coal. (Dr. S. E. Maddigan, director of the research council, declined to estimate probable costs of producing domestic gas from wood waste.)

Retail price of domestic gas in November is $1 for the first 300 cu ft or less, 11 cents per 100 cu ft for the next 1700, 9 cents a hundred for the next 23 Mcf, and 11 cents a hundred for the excess.

Gorgas Fire Starts

The second underground gasification project at Gorgas, Ala., *(GAS,* April, p. 40*)* was fired March 18 by an incendiary bomb. The experiment, conducted under the supervision of the Alabama Power Co. and the U.S. Bureau of Mines, will reveal whether cheap gas of commercial Btu content can be produced by firing coal deposits and drawing off the resultant gas.

In order to enrich the gas, chemists and engineers plan to blow oxygen and steam over the burning bed. This phase of the project was scheduled to start around the first of May.

REGULATION

Hoover Looks at FPC

The Hoover Commission took a long look at the Federal Power Commission while it was examining the government's regulatory agencies (FPC, SEC, ICC, FCC, etc.) and found it in pretty good shape in the main. Certain changes were recommended, however, consistent with the commission's overall verdict on the regulatory agencies: Administrative justice now is "not characterized by economy, simplicity, and dispatch."

Hoover's men noted that there are "certain advantages in the establishment of a separate gas bureau."

The commission also recommended that the FPC's power planning functions be transferred to a new Water Development Service. It further said that the act under which the FPC operates should be amended to protect the members' security of tenure; that the president should be able to remove only for cause, as is the case with most of the other agencies. The Hoover-headed group wants the act to provide for member continuance—a full strength proposal—in office until a new appointee is named when a term expires. It was recommended that the salaries of FPC commissioners and their principal staff members be raised.

The investigators made other recommendations about the internal workings of the FPC and the divisions and placement of authority. Chief step advised was the formation of a bureau of administration which would be responsible directly to the FPC chairman, who should take his office by presidential appointment and not by member vote. The chairmanship should be given a larger executive role, according to the report.

Another major change advised with the abolishment of the supervising commissioner system as an administrative device, with its replacement being "efficient administrative reporting," and the commissioner acting as coordinator of the various staff bureaus and a point of contact for the interested private companies during the steps preceding formal hearings and determinations.

Free Copies

In the bibliography following the article "Interchangeability of Oil Gas With Natural Gas," which appeared last month in *GAS* (pp. 60-64), certain papers were marked with an asterisk.

Copies of the papers so marked (Nos. 1, 2, 4, 6, and 7) may be obtained by writing to the Gas Machinery Co., 16100 Waterloo Road, Cleveland 10, Ohio, where the article's authors, Arthur W. Krause and A. M. Cunningham, are staff engineers.

Lowell Gas Light Wins

The Massachusetts Supreme Court in late March severely snubbed the State Department of Public Utilities by deciding that the Lowell Gas Light Co.'s appeal from a DPU rate decision was perfectly valid. In essence, the court decided that public utility companies in Massachusetts must be allowed rates sufficient to yield a fair return on the property's value. Lowell Gas Light had held that the rates granted by the DPU were confiscatory and appealed the decision. The fight may be taken to the U. S. Supreme Court.

The Massachusetts court eliminated from consideration for rate increases the profit or loss incurred by Lowell Gas Light in merchandising and jobbing. The Department of Public Utilities will not permit such losses to be charged to expenses, but did take into account any profits in estimating a "reasonable return from all sources."

In another action taken shortly after the Lowell case, the State Supreme Court reversed itself from a position taken previously and gave Boston Consolidated Gas Co. a raise it sought last year. Boston Con had asked for a $2.1 million rate boost; the DPU gave it $1.6 million; the court has now added the half-million dollar difference. This not only makes a big difference to Boston Con, but shows that the court's new line is a steady one.

New England Survey

The possibility of importing natural gas to New England will be surveyed by a New England project recently agreed upon by the governors of the six northeastern states. The governors signed a 10-year agreement which calls for a continuing survey of the area's natural and economic resources, the cost to be borne by the states in proportion to their population.

Ratification of the project by state legislatures and the Congress will be sought.

Annual budget for the surveys will be $200,000. In addition to the natural gas importing survey, other projects to be investigated immediately are the possibility of establishing a regional steel industry and the seeking of low cost electric power.

MISCELLANY

CIO Wins Jurisdiction

In late March the United States Court of Appeals refused to intervene in the dispute of Local 148 of the AFL Operating Engineers' Union with the CIO United Gas, Coke and Chemical Workers Union (Local 6), the National Labor Relations Board, and the Laclede Gas Light Co., St. Louis. An appeal from a district court ruling had been made by the AFL union; the action stemmed from the NLRB election in the company's Shrewsbury plant which the CIO won.

Laclede has a union-shop contract with the CIO. The Shrewsbury workers had had an AFL contract when the plant was purchased by Laclede. In mid-March Laclede sent dismissal notices to more than 250 employees who failed to give up their AFL affiliations and join the CIO.

In the court's unanimous decision it was held that Congress gave the NLRB the power to name a union to be the bargaining agent for employees. "An appeal for relief should be addressed to the Congress, not to the courts," the judgment said.

Gas Movie Made

East Ohio Gas Co., Cleveland, is releasing a new motion picture, "Our Silent Partner," which tells the story of natural gas from the planning and drilling of gas wells to its use for homes and industry. The film is in color and is accompanied by sound. It is 27 minutes long.

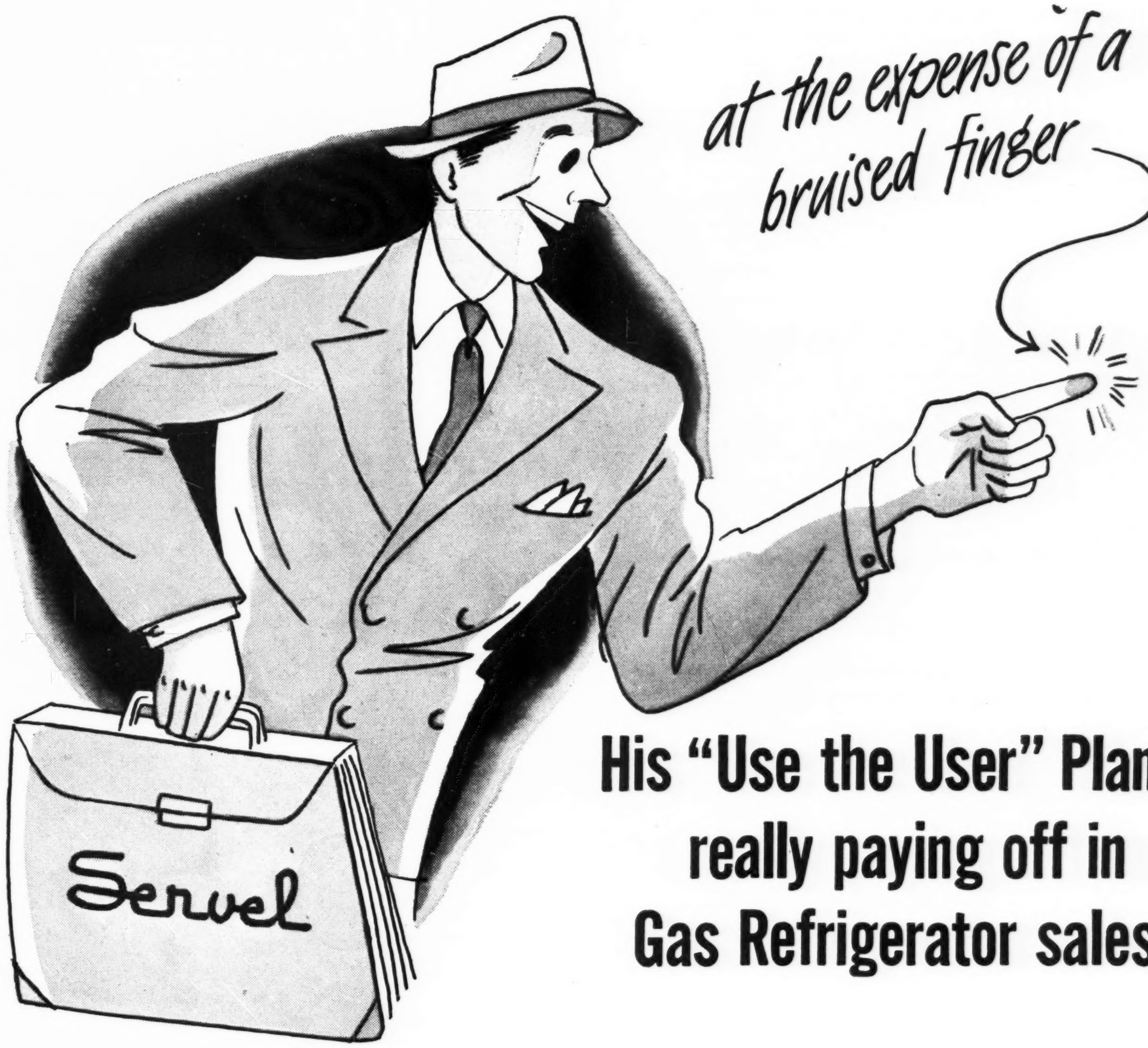
Many of the scenes were taken in Ohio, West Virginia, and Texas, where the film was in preparation for almost a year. It was produced by Robert Yarnell, Richie Production Inc., and was planned by the company with the aid of its advertising agency, Ketchum, MacLeod & Grove Inc.

Business Census On

The first business census since the war is now in progress. Retail, wholesale, and service trade establishments are being visited by 4500 census takers, working out of 300 field offices. It is expected that some preliminary statistical reports of the census results will be out by the end of this year. The rest of the reports will be published during the next two years. Census takers are concerned with 1948 business figures.

The last business census was made in 1940, covering 1939 activities. The present one will require the census takers to visit about three million establishments in the United States, Alaska, and Hawaii.

A good day's selling done...



His "Use the User" Plan is really paying off in Gas Refrigerator sales!

Sure, his finger is slightly sore from pushing doorbells, but he's pretty satisfied with himself . . . and so is his sales manager. This salesman has just landed some nice Gas Refrigerator sales, and has uncovered several more *live* prospects. He did the job door-to-door, too, but he didn't have to canvass "cold." He *used* his old customers to help pave the way for him.

This fellow is in the buyer's market frame of mind. He wasn't caught yawning when the seller's market pulled its fast fade. He didn't despair when easy-selling days came to an end. He and his sales manager knew what was needed—good, old-fashioned *outside* selling, backed by ideas that help *find* prospects and *create* sales . . . like "Use the User." This plan is still one of the most effective, most logical ways to find new Servel prospects. In fact, 55% of all sales are influenced by the user! That's why you should put your sales force to work following up customers' leads by calling on their friends and neighbors.

Reward customers whose tips lead to sales

Most of your customers will be glad to give you leads, but you can really make it worth their while by offering them a specified amount of cash or useful gift with every sales-producing lead. And think of the goodwill you'll build. These users are primary prospects for other gas appliances. When they need a new gas range or gas water heater, *you* will be the dealer they will want to do business with. For detailed information on "Use the User" and other buyer's market selling plans, write to Servel, Inc., Evansville 20, Indiana.

PEOPLE

W. H. AINSWORTH, general auditor for the United Gas system since 1946, retired recently. He served as assistant general auditor from 1930 to 1946. Mr. Ainsworth's retirement necessitated the following promotions: J. C. Wright, assistant general auditor, to chief accountant, directing the general accounting of the companies; R. U. VANDERVOORT, to head of a new department created to handle budgets and regulatory accounting matters; and J. H. WINBERY to head of the plant accounting department. W. H. BAINES is now in charge of the United Gas Pipe Line accounting section.

E. A. BROWN, Lone Star Gas Co.'s superintendent of production, has been named head of the new exploration and gas supply department which will coordinate operations of the land, geological, and production departments. J. PAUL ROGERS, who has been assistant field supervisor, has been advanced to exploration engineer. CARL M. HILL has been moved up from chief production engineer to superintendent of production, and M. O. ATTEBERRY, field supervisor of production, is now assistant chief production engineer. W. F. BURKE is the new chief production engineer.

EVERETT J. BOOTHBY, vice president and general manager of the Washington (D.C.) Gas Light Co., was elected president on March 30, succeeding the late Marcy L. Sperry. HOWARD B. NOYES, former general superintendent, was elevated to vice president. Mr. Boothby had held this position since 1932. Other promotions include that of

E. J. Boothby

H. B. Noyes

DONALD S. BITTINGER to general superintendent, FRANK P. LAMB to superintendent of distribution, and ANDREW W. JOHNSTON JR. to director of personnel.

H. EMORY PEDDICORD of Baltimore has been selected as sales representative in Maryland and southern Delaware for the Kitson Division of The Welsbach Corp., Philadelphia. Mr. Peddicord will handle the firm's line of gas and water stops, relief valves, steel bar stock valves, brass bath traps, iron drum traps and plumbing specialties. In western Pennsylvania, eastern Ohio, West Virginia and Cumberland, Md., the same line will be handled by THOMAS M. HODGES and WILLIAM I. NEGLE of the Pittsburgh firm of Hodges & Negle.

GEORGE W. HORSLEY has been appointed general manager and ROBERT W. RAMSDELL is new general superintendent of The East Ohio Gas Co., Cleveland. Mr. Horsley has been associated with the utility for 34 years, acting as superintendent of the Cleveland plant, local manager of the Youngstown Division, general superintendent of outside towns and, since 1934, of the entire system.

G. W. Horsley

R. W. Ramsdell

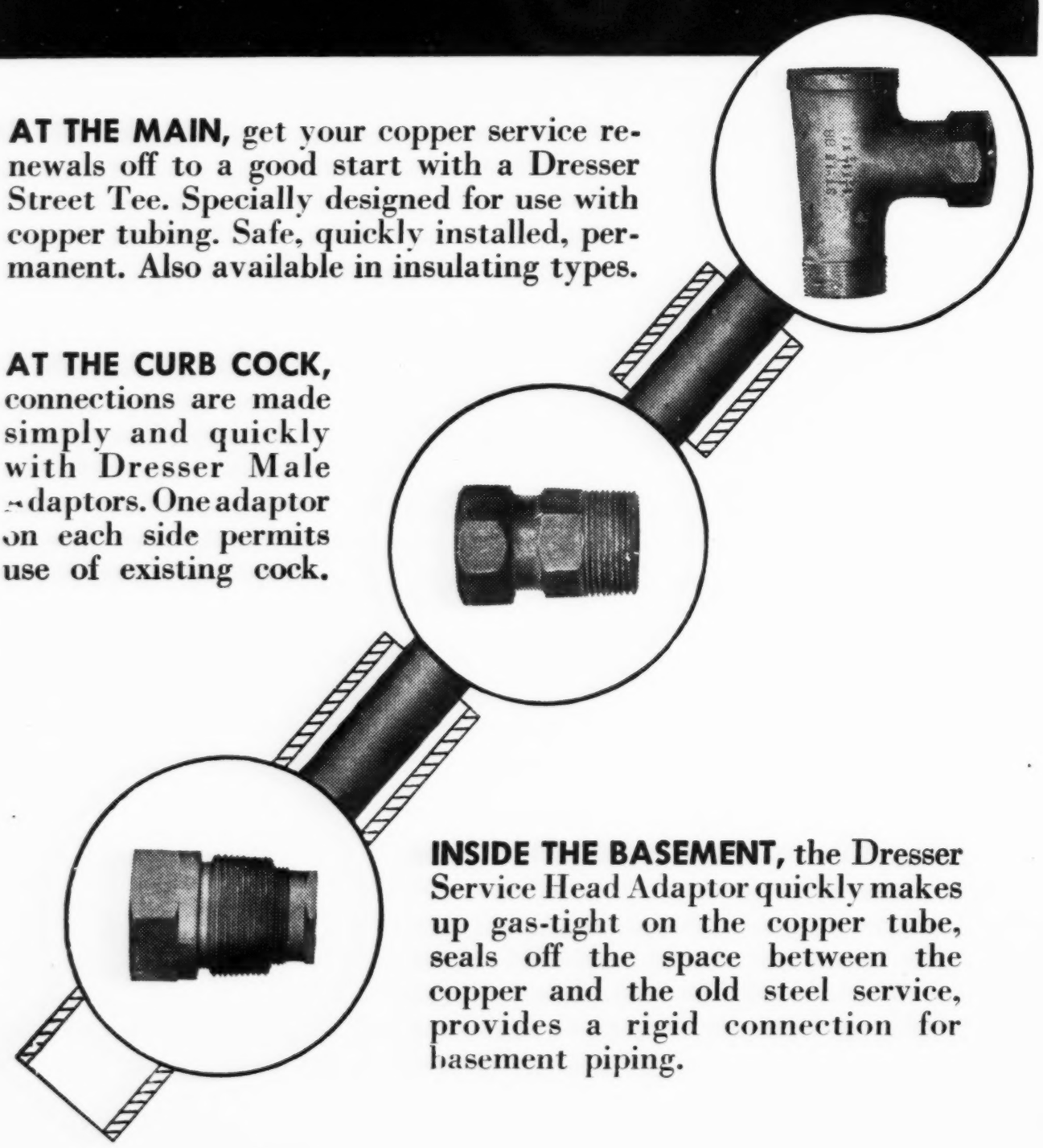
Mr. Ramsdell's 21-year career with East Ohio parallels that of his predecessor. He served as general foreman in Akron and in Youngstown, local manager in Youngstown, and since 1945 as assistant general superintendent in Cleveland.

B. M. DeBEE has been appointed district manager, Eastern division, Detroit-Michigan Stove Co. Mr. DeBee will work under C. M. Jewell, Eastern divisional sales manager.

SPECIALIZED Fittings for your
COPPER TUBE SERVICE RENEWALS

AT THE MAIN, get your copper service renewals off to a good start with a Dresser Street Tee. Specially designed for use with copper tubing. Safe, quickly installed, permanent. Also available in insulating types.

AT THE CURB COCK, connections are made simply and quickly with Dresser Male Adaptors. One adaptor on each side permits use of existing cock.

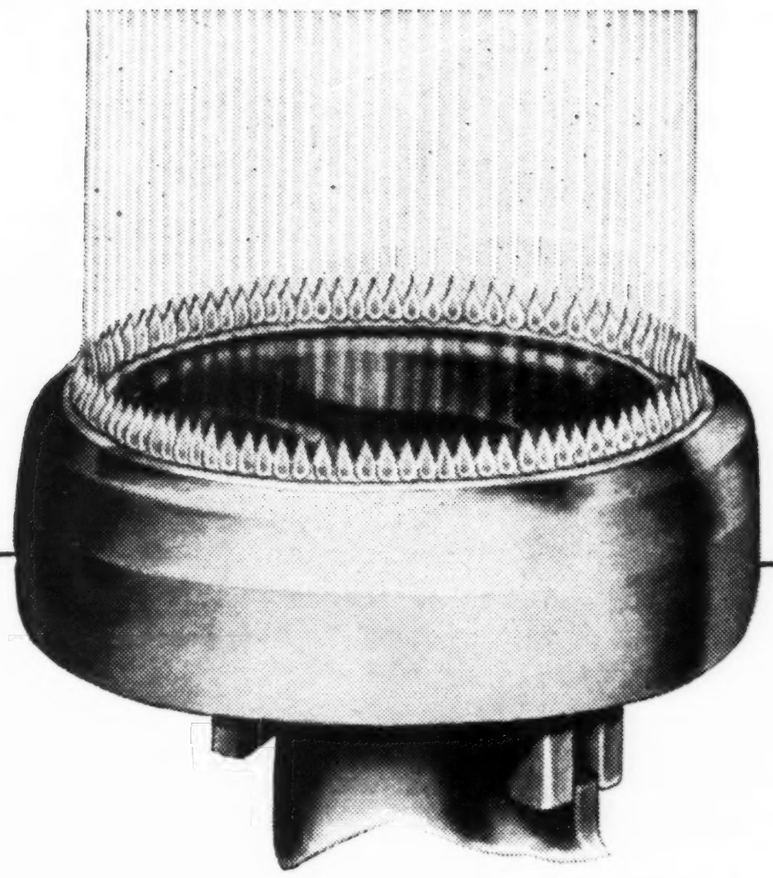


INSIDE THE BASEMENT, the Dresser Service Head Adaptor quickly makes up gas-tight on the copper tube, seals off the space between the copper and the old steel service, provides a rigid connection for basement piping.

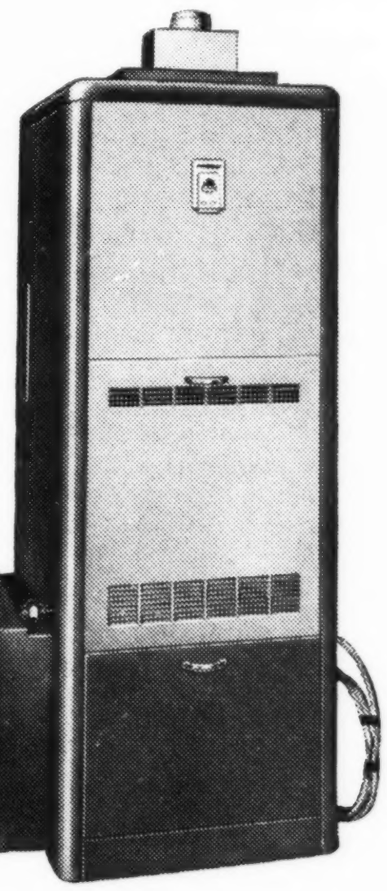
Fittings illustrated are part of a *complete line* of service fittings designed by Dresser especially for copper tube renewals. *Write today*—ask for sales engineer to call and explain how others are using copper tubing.

DRESSER "COPR-TUBE" FITTINGS

Dresser Manufacturing Division (One of the Dresser Industries), 59 Fisher Ave., Bradford, Pa. In Texas: 1121 Rothwell Street, Houston • In Canada: Dresser Manufacturing Co., Ltd., Toronto, Ont. • Sales Offices: New York, Chicago, Houston, San Francisco



It takes good equipment to burn gas *Wisely*



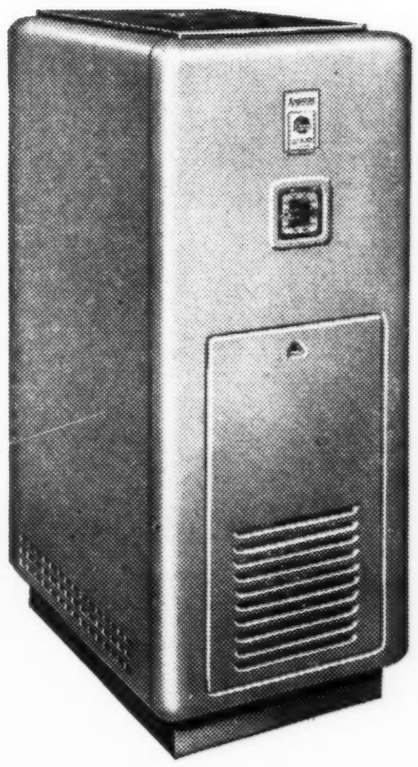
WYANDOTTE Winter Air Conditioner is ideally suited for individual apartments and homes without basements. Has copper-bearing steel heating element which resists corrosion and rust. Extensive heating surface absorbs maximum heat from hot gases before they enter flue, assuring high efficiency and economy.

■ When it comes to the greatly increasing demands for gas, there are two ways in which good gas-fired heating equipment can help.

It can use gas efficiently and economically. American-Standard Heating Equipment is designed, engineered, and thoroughly tested to provide maximum heat from every cubic foot of gas.

It can provide the customer with many years of comfort and trouble-free service. Our Institute of Heating Research helps us to assure that users of American-Standard Heating Equipment will be satisfied "salesmen" for gas as a fuel.

So whether your new customers are interested in radiator heating, warm air heating, or winter air conditioning, you can be sure that American-Standard Heating Equipment is both a safe and a wise recommendation for you to make. **American Radiator & Standard Sanitary Corporation,** P. O. Box 1226, Pittsburgh 30, Pa.



EMPIRE Gas Boiler has all the features essential to perfect performance and customer satisfaction, including pin type cast iron sections —the most effective type of cast iron heat absorbing surface. Sections are joined with gas-tight, metal-to-metal fit to assure maximum combustion efficiency.

Look for this AMERICAN-Standard HEATING · PLUMBING *Mark of Merit*

AMERICAN-Standard

First in heating . . . first in plumbing

Serving home and industry

AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILER • ROSS HEATER • TONAWANDA IRON

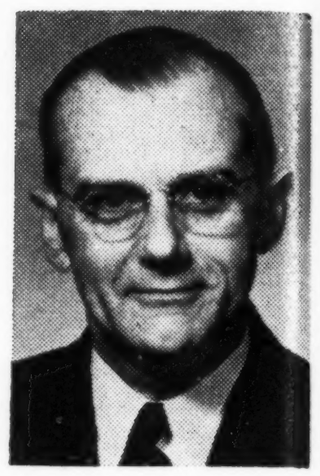
J. S. Phillips
. . . Columbia Eng.

R. G. Caouette
. . . Pitt Meter

John J. Dowling
. . . Conn Power

C. S. Bygate
. . . Rockwell

F. S. Cornell
. . . A. O. Smith



W. T. Shinholser
. . . Ohio Fuel

JAMES S. PHILLIPS has assumed his new duties in New York as director of purchases for Columbia Engineering Corp., service company of the Columbia Gas System Inc. Mr. Phillips has been associated with the Columbia system since 1929. For the past 17 years he has been with The Ohio Fuel Gas Co. in Columbus.

RALPH G. CAOUETTE has been appointed general manager of the Pittsburgh Equitable Meter Division of Rockwell Manufacturing Co. Mr. Caouette was production superintendent of the company's Delta division before going to Pittsburgh. He later became manager of industrial engineering for all Rockwell plants.

JOHN J. DOWLING, former manager of the New London division of Connecticut Power Co., has been elected vice president in charge of engineering and operation of gas facilities. Mr. Dowling joined the firm in 1923 as plant superintendent. He served successively as assistant to the New London division manager, operating manager, and finally manager of the division. He has acted as consulting gas engineer for the company for several years.

C. S. BYGATE recently was appointed assistant vice president of Rockwell Manufacturing Co.'s meter and valve divisions by L. A. Dixon, vice president. Mr. Bygate started in the company's Pittsburgh Equitable Meter Division and later transferred to general purchasing.

F. S. CORNELL has been named assistant manager of the Water Heater Division of A. O. Smith Corp., Milwaukee. During the war Mr. Cornell became familiar with the company's operation when as an Air Force major he acted as contracting and terminations officer. Since the war he has served as assistant to President W. C. Heath. Mr. Cornell will headquarter in Kankakee, Ill.

W. T. SHINHOLSER, chief engineer of The Ohio Fuel Gas Co., Columbus, since 1944, has been elected a member of the company's board of directors. Mr. Shinholser was associated with Cities Service Co. for 12 years before joining Ohio Fuel in 1929. He is active in the program of the AGA Laboratories and in the research work of the Institute of Gas Technology.

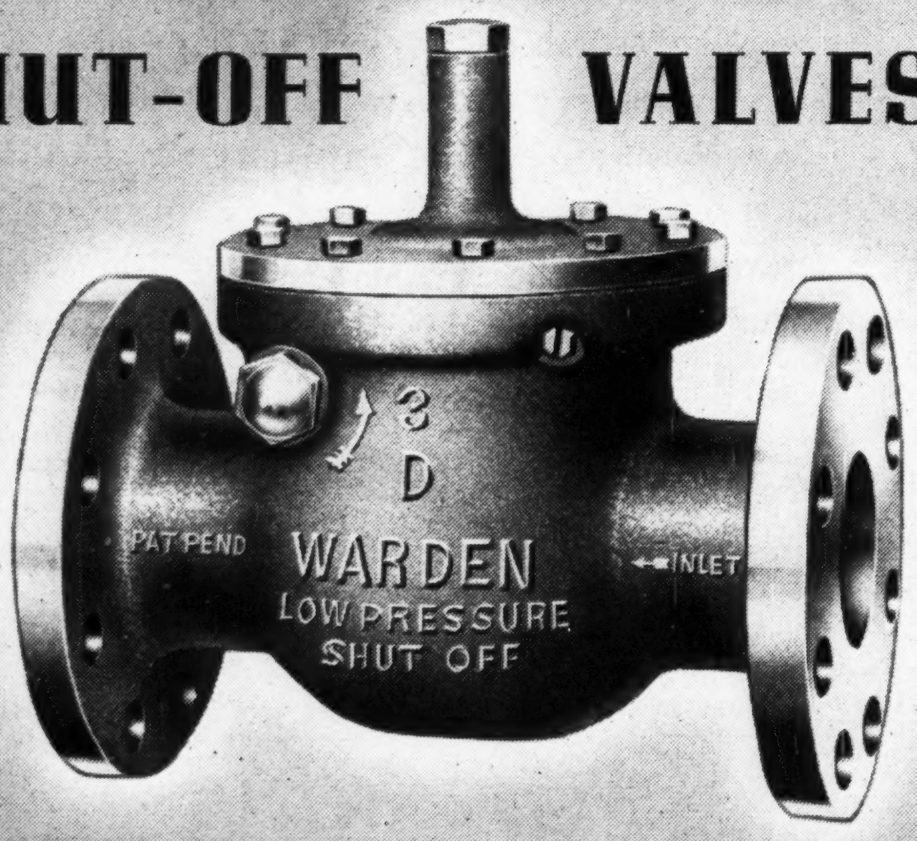
HERVEY M. AMSLER, Houston, heads the list of Tennessee Gas Transmission Co. directors recently re-elected. Mr. Amsler is vice president of Richrock Royalty Co. Other directors are ROBERT K. HANGER, Cantey, Hanger, McKnight & Johnson, Fort Worth;

WARDEN AUTOMATIC LOW-PRESSURE SHUT-OFF VALVES

For Commercial and Industrial Users of Gas

•

For use on Gas Company Distribution Lines



Models available for either high or low pressure application. Write for comprehensive bulletin containing complete engineering information

POSITIVE SHUT-OFF **FULL-FLOW DESIGN**

Warden Shut-Off Valves provide absolute shut-off of fuel when the supply pressure fails *due to any cause.* The closure is positive. It will not leak or seep . . . will not re-open when the pressure returns . . . valve must be reset *manually* after the pressure is restored.

Manufactured by.. **SECURITY VALVE COMPANY** *A California Corporation*

410 SAN FERNANDO ROAD • LOS ANGELES 31, CALIFORNIA

THE GAS INDUSTRY DEMANDS *SAFETY!*

The excellent safety record of the gas industry is the result of constant attention to, and practice of the best operating methods. Heretofore, guides to safe practices have come from many different sources. The JULY SAFETY ISSUE of GAS is the first attempt in this industry to assemble in one publication a representative collection of articles, illustrations and charts on safe operating techniques. This issue has been months in the making, combining the research, ideas, and writings of top engineers and executives from all phases of the industry.

Regular subscribers will receive the JULY SAFETY ISSUE at no extra charge as part of their subscriptions.

EXTRA COPIES ORDERED BEFORE JUNE 1ST WILL BE $1 PER COPY. AFTER THAT DATE, THE COST WILL BE $2 EACH.

The following companies have placed orders for extra copies of the JULY SAFETY ISSUE (to April 12th), for distribution to their key employees and dealers. More orders are being received every day.

ALLIED GAS COMPANY
Paxton, Illinois

ARUBA GAS SUPPLY CO., LTD.
Aruba, N.W.I.

BATTLE CREEK GAS CO.
Battle Creek, Michigan

CANADIAN WESTERN NATURAL GAS CO., LTD
Calgary, Alberta

CENTRAL ELECTRIC & GAS CO.
Lincoln, Nebraska

CENTRAL ILLINOIS ELECTRIC & GAS CO.
Rockford, Illinois

CENTRAL ILLINOIS PUBLIC SERVICE CO.
Springfield, Illinois

CENTRAL NEW YORK POWER CORP.
Syracuse, New York

CINCINNATI GAS & ELECTRIC CO.
Cincinnati, Ohio

CITIZENS UTILITIES CO.
Greenwich, Connecticut

COAST COUNTIES GAS & ELECTRIC CO.
Concord, California

COLORADO INTERSTATE GAS CO.
Colorado Springs, Colo.

COMMUNITY PUBLIC SERVICE CO.
Ft. Worth, Texas

CONNECTICUT POWER COMPANY
Stamford, Connecticut

CONSOLIDATED EDISON CO. OF NEW YORK
New York, New York

CONSOLIDATED GAS UTILITIES CORP.
Oklahoma City, Oklahoma

CONSUMERS GAS CO. OF TORONTO
Toronto, Canada

EAST OHIO GAS CO.
Cleveland, Ohio

ELIZABETHTOWN CONSOLIDATED GAS CO.
Elizabethtown, New Jersey

EMPIRE GAS & FUEL CO., LTD.
Wellsville, New York

HARRISBURG GAS CO.
Harrisburg, Pennsylvania

HARTFORD GAS COMPANY
Hartford, Connecticut

HOPE NATURAL GAS CO.
Parkersburgh, West Va.

HOUSTON NATURAL GAS CO.
Houston, Texas

LAS VEGAS GAS CO.
Las Vegas, Nevada

LOUISIANA POWER & LIGHT CO.
New Orleans, Louisiana

LOUISVILLE GAS & ELECTRIC CO.
Louisville, Kentucky

LOWELL GAS LIGHT COMPANY
Lowell, Massachusetts

METROPOLITAN UTILITIES DISTRICT
Omaha, Nebraska

MICHIGAN CONSOLIDATED GAS CO.
Detroit, Michigan

MINNEAPOLIS GAS COMPANY
Minneapolis, Minnesota

MISSISSIPPI POWER & LIGHT CO.
Jackson, Mississippi

MISSOURI POWER & LIGHT CO.
Jefferson City, Missouri

MONTERREY RAILWAY, LIGHT AND POWER CO.
Monterrey, N.L., Mexico

MOUNTAIN FUEL SUPPLY CO.
Salt Lake City, Utah

THE NEW ENGLAND GAS ASSOCIATION
Boston, Massachusetts

NORTH SHORE GAS COMPANY
Waukegan, Illinois

NORTHWESTERN UTILITIES, LTD.
Edmonton, Alberta

OHIO OIL COMPANY
Casper, Wyoming

OKLAHOMA NATURAL GAS CO.
Tulsa, Oklahoma

PENDLETON NATURAL GAS CO.
Pendleton, Indiana

PIEDMONT RULANE COMPANY
Greenville, S. Carolina

RIVER GAS COMPANY
Marietta, Ohio

ROCKLAND GAS CO., INC.
Spring Valley, New York

SEATTLE GAS COMPANY
Seattle, Washington

SIOUX CITY GAS & ELECTRIC CO.
Sioux City, Iowa

SOUTH ATLANTIC GAS COMPANY
Orlando, Florida

SOUTH JERSEY GAS COMPANY
Atlantic City, New Jersey

TEXAS EASTERN TRANSMISSION CORP.
Shreveport, Louisiana

TEXAS PUBLIC SERVICE CO.
Austin, Texas

TUCSON GAS, ELECTRIC LIGHT & POWER CO.
Tucson, Arizona

DANIEL VELA, S. A.
Mexico, D. F.

VIRGINIA ELECTRIC & POWER CO.
Norfolk, Virginia

WATAUGA VALLEY GAS CO.
Johnson City, Tennessee

WESTERN KENTUCKY GAS CO.
Owensboro, Kentucky

WISCONSIN PUBLIC SERVICE CORP.
Milwaukee, Wisconsin

WISCONSIN SOUTHERN GAS CO.
Burlington, Wisconsin

MANUFACTURERS

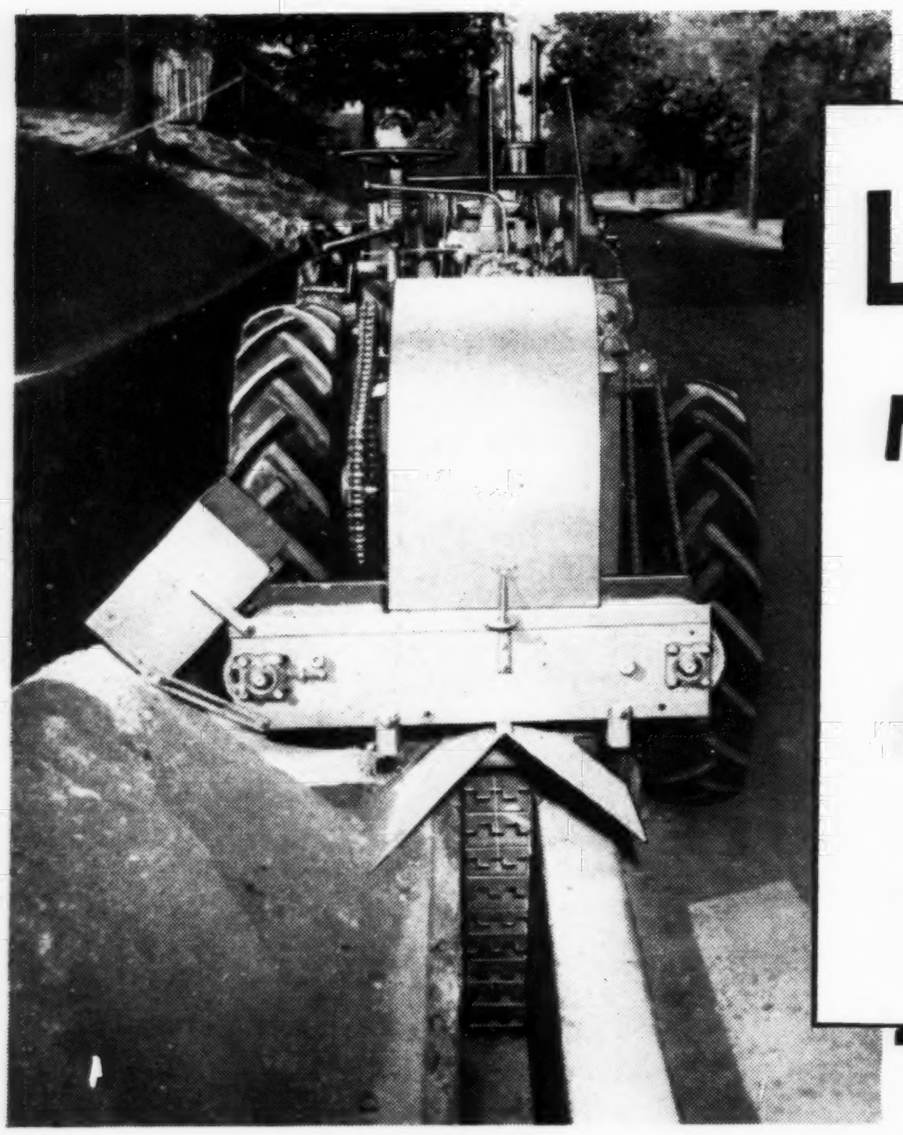
For manufacturers who have built SAFETY into their products, the JULY SAFETY ISSUE will be the largest and most important issue of the year. Circulation will be over 10,000 copies . . . at no advance in advertising rates.

Advertising Forms Close June 17th.

GAS

A JENKINS PUBLICATION

198 South Alvarado Street
Los Angeles 4, Calif.



Longhorn Mobile Ditcher Has The Features You Specified

A partial list of companies who have one or more Longhorn Mobile Ditchers in use.

ARKANSAS LOUISIANA GAS COMPANY

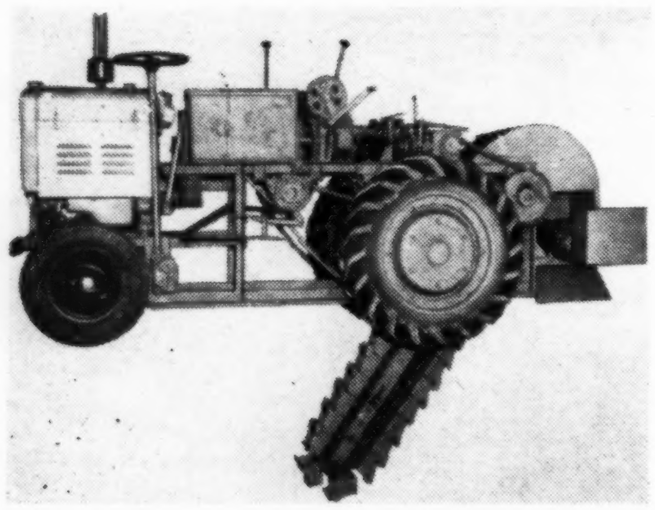
HOUSTON NATURAL GAS CORPORATION

UNITED GAS CORPORATION

LA. MISS. PIPE LINE CONSTRUCTION COMPANY

WOODWARD INDEST CONTRACTING COMPANY

DITCH DIGGING CONTRACT SERVICE



Based on an AGA report on lightweight service trenchers the Longhorn Mobile Ditcher incorporates 90% of the industries' requirements.

Maximum trench depth—3½ feet

Trench width—6 to 12 inches

Rated digging speed—1 to 25 feet per minute

Machine weight—5000 lbs.

Mobility—15 MPH under own power

One-man operation

Excavates openings for service connections to main.

Plus these additional features:

Hip action—allows operation of 30% lateral slope without undercutting.

Exclusive digger and bucket design prevents clogging

Normal tread of 43" can be spread to 63" where cave-in conditions exist

Turning radius—12 feet

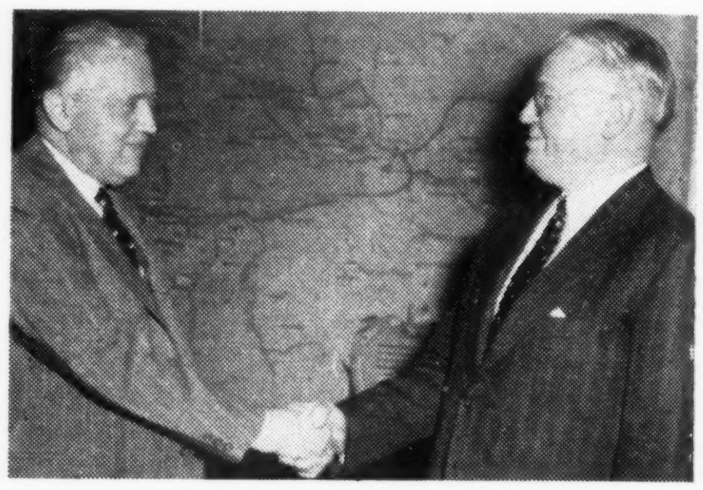
Literature giving complete information will be sent on request.

Longhorn Industries, Inc.

HENDERSON, TEXAS PHONE 1035

ARDON B. JUDD, A. B. Judd Supply Co., Houston; EUGENE McELVANEY, First National Bank of Dallas; ROY S. NELSON, Gulf States Utilities Co., Beaumont; and H. GARDINER SYMONDS and W. E. MUELLER, president and vice president of TGT.

ARTHUR L. JOHNSON, treasurer of the Dearborn Chemical Co., Chicago, was elected secretary-treasurer and a member of the board of directors at a recent stockholders meeting. Prior to joining Dearborn in 1947, he was controller and assistant treasurer of the Chicago Metal Hose Corp. At the same time, announcement was made of the election of H. NEVILLE POTTER as executive vice president and general manager of Dearborn Chemical Co., Ltd., Toronto, and the addition of FRANK C. LIPSCOMB to the railroad department service staff in Chicago.



C. H. GUEFFROY (left), new president of Portland (Ore.) Gas & Coke Co., receives congratulations from retiring president Paul B. McKee, who has headed both the gas company and Pacific Power & Light Co. since 1933. McKee resigned from the gas company on April 7 as a step toward separation of the two companies.

TIMOTHY BROWN has succeeded Lynn H. Ashley as a member of the Wisconsin Public Service Commission. The appointment was confirmed recently by the state senate. In Virginia, L. McCARTHY DOWNS has been named chairman of the State Corporation Commission, succeeding Commissioner W. MARSHALL KING. Commissioner King remains as a member.

MARY E. DILLON, president of the Brooklyn Borough Gas Co. for 23 years, has resigned. She was succeeded by WALTER M. JEFFORDS JR., a director. KARL B. WEBER, who has been with Consolidated Edison Co. of New York Inc. for more than 20 years, was elected a vice president of Brooklyn Borough.

M. K. Wrench

M. K. WRENCH, superintendent of production for the Metropolitan Utilities District of Omaha, has been appointed manager of the department of gas operation. Mr. Wrench was employed by a number of utilities, including the Minneapolis Gas Light Co. and Savannah (Ga.) Gas Co. before joining Metropolitan Utilities in 1939. He has spent his entire business life in the construction and operation phases of the manufactured and natural gas industries.

E. MAURICE MYERS has taken over operation of the compressor station system of Consolidated Gas Utilities Corp., Oklahoma City. Mr. Myers, who joined Consolidated in 1945, served as engineer for the Oklahoma Corporation Commission for eight years. HARRIS GLENN, engineer and chief of the drafting department, has added purchasing to his duties. The work being taken on by Mr. Myers and Mr. Glenn was formerly handled by C. S. Worley, who resigned recently.

J. CLARENCE KIMPEL, secretary and treasurer of the C. M. Kemp Manufacturing Co. of Baltimore, has been elected president and chairman of the board, succeeding the late Wallace W. Kemp. EDWARD F. FUNK JR. was elected vice president and will continue in his capacity as chief engineer. CHARLES E. WILBUR, assistant secretary and treasurer, became secretary and treasurer, and WILFRED G. KEIR was added to the board of directors.

MILTON W. HEATH, president of Heath Tree Service Inc., Wellesley, Mass., recently was knighted by The Netherlands for services to that country during the war. Official title bestowed upon Mr. Heath by decree of the queen of The Netherlands is Knight of the Royal Order of Orange-Nassau. Heath Tree Service does engineering survey work for gas and electric utilities in the U.S. and Canada.

DR. RALPH L. NUTTALL has been appointed to the staff of the National Bureau of Standards, Washington, D. C., where he will do research on the thermal conductivity of gases at elevated temperatures and pressures in the thermodynamics laboratory. Dr. Nuttall did graduate work at Yale and was awarded the Du Pont fellowship in physical chemistry for 1947 and 1948.

HANSELL HILLYER was re-elected president and general manager of the South Atlantic Gas Co. at a recent directors meeting. At the same time the board re-elected C. J. NODA as vice president of the St. Augustine division and C. E. PELOT as division counsel. C. B. REINSCHMIDT, Orlando, was promoted to vice president of the utility.

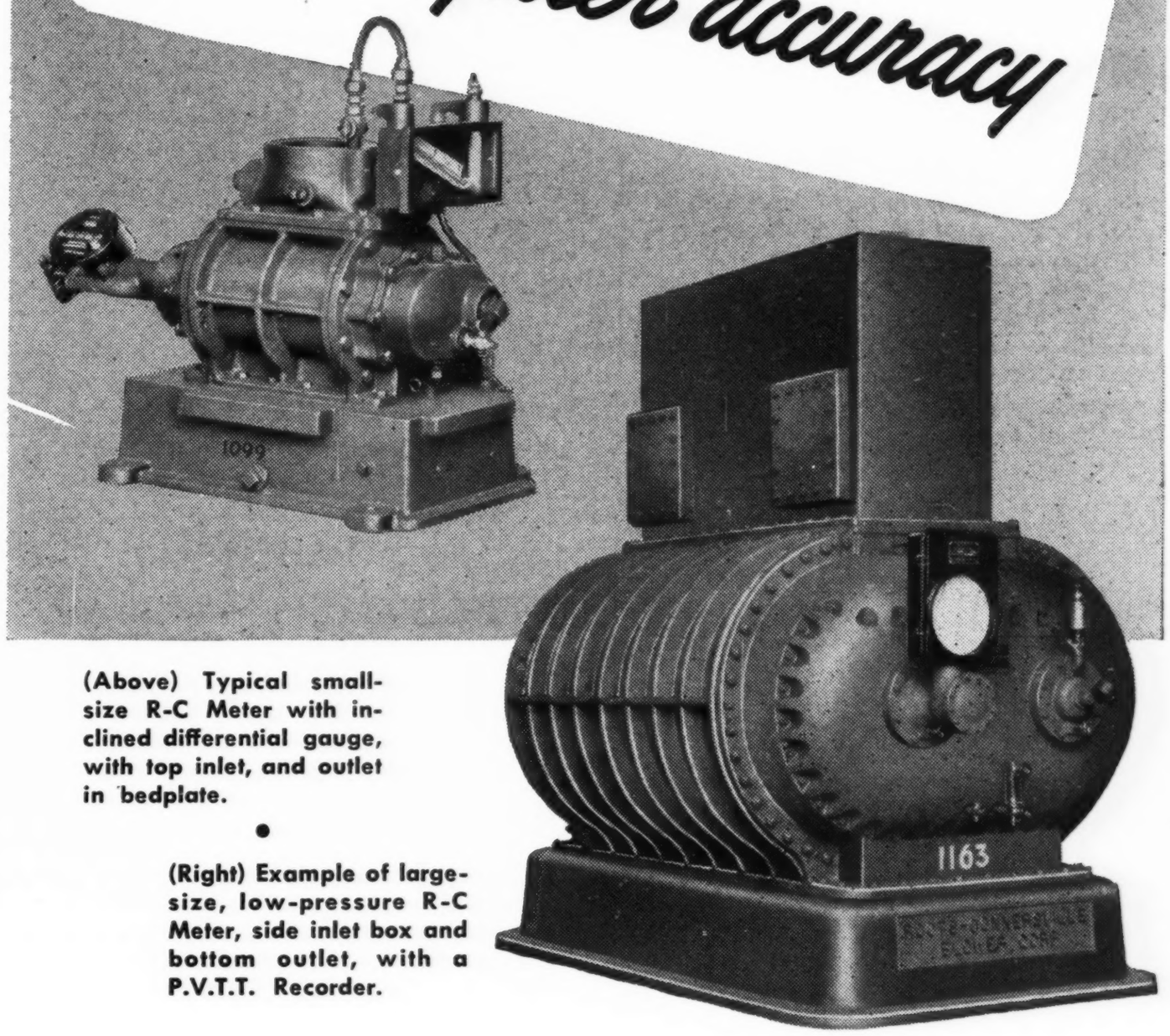
ALEX K. TINKER has been named manager of the New York branch sales office of The National Radiator Co., Johnstown, Pa. Mr. Tinker, who joined the company in 1928, has been Pittsburgh manager since 1931. FRED S. HUDSON, sales engineer since 1936 in the company's Richmond and Washington branch offices, succeeds him.

ROBERT E. BORDEN recently was appointed director of publicity and advertising for the Liquefied Petroleum Gas Assn. For many years Mr. Borden was publicity director of Commonwealth Edison Co. Since 1947 he has been identified with the National Patent Council, American Fair Trade Council and the Anderson Co. of Gary, Ind.

GEORGE FRIEDERICH heads George R. Friederich & Co., new district sales representative in the San Francisco area for Fisher Governor Co., Marshalltown, Iowa. Mr. Friederich has been associated with Fisher Governor since 1930 and has been Pacific Coast sales manager since 1934.

MEASURE AIR OR GAS WITH

cash-register accuracy



(Above) Typical small-size R-C Meter with inclined differential gauge, with top inlet, and outlet in bedplate.

(Right) Example of large-size, low-pressure R-C Meter, side inlet box and bottom outlet, with a P.V.T.T. Recorder.

Built-in characteristics of R-C Positive Displacement Meters insure unfailing, long-time accuracy:

1. **Accuracy is not affected by variations in specific gravity. rate of flow, pulsation, moisture or impurities.**
2. **Accuracy does not depend on uncontrollable factors.**
3. **Accuracy is not subject to adjustment of meter or recorder by operators.**
4. **Accuracy is not affected by reasonable overloads.**
5. **Accuracy is permanent because measuring chambers are surrounded by precision-machined cast iron surfaces.**

R-C Meters are built in 31 standard sizes, with capacities from 4,000 to 1,000,000 CFH. Indicating and recording instruments are available for all types. Send for details in Bulletin 40-B-14 or write us about your specific problem.

ROOTS-CONNERSVILLE BLOWER CORPORATION
905 Oregon Avenue, Connersville, Indiana

ROOTS-CONNERSVILLE

BLOWER BUILDERS • R-C • SINCE 1854

BLOWERS • EXHAUSTERS • BOOSTERS • LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

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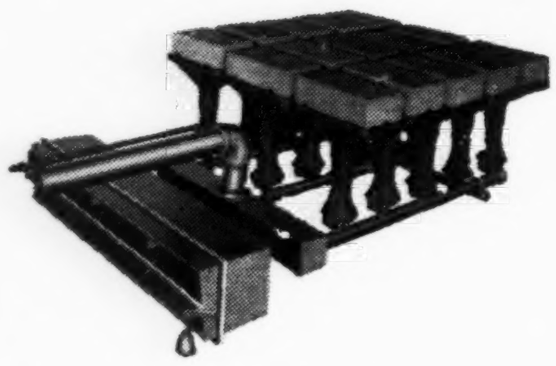

SERIES F600 GAS BURNER

For Low Pressure Gas

The Series F600 Gas Burner is the famous vertical atmospheric venturi gas burner, with the radiant refractory top, that utilizes straight natural gas and mixed gas to 800 Btu at pressures from 2"wc to 8 ounces. Series F600 Burner Assemblies are available with ratings from 50,000 to 10,000,000 Btu/hr for firing all types of steel firebox and sectional boilers.

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THE

WEBSTER ENGINEERING

COMPANY

Tulsa, Oklahoma

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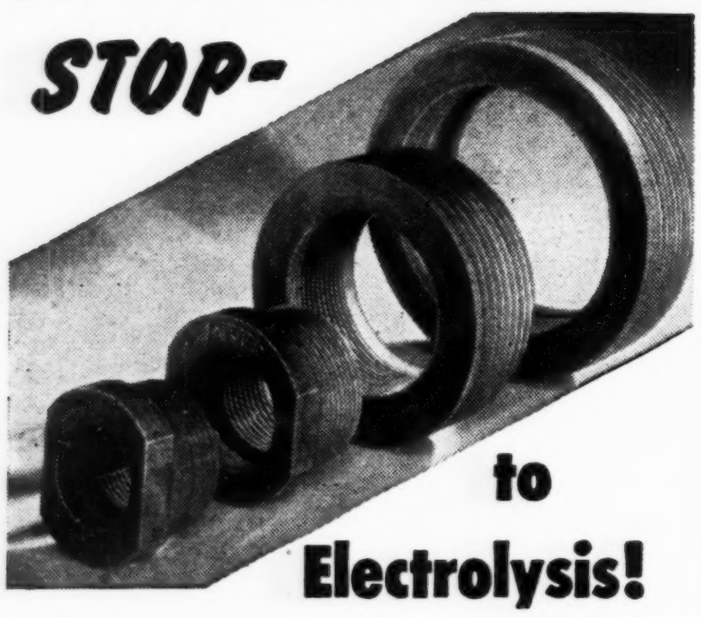

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Give your pipe line longer life! Formica Bushings . . . used by leading gas companies . . . effectively insulate pipes, positively prevent electrolytic corrosion. They're tough and strong, have constant dielectric strength, and retain their dimensional stability even under extremes of temperature. Write for illustrated data sheet.

Seven standard sizes for ¼x½ to 3x4 reducing couplings; wrench-land styles in ¾" and 1" sizes . . . and all are ready for prompt delivery.

The Formica Co.
4681 Spring Grove Ave.
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Productive FORMICA at Work in Industry

FREDERIC A. DEININGER has been appointed Eastern division manager of The Estate Stove Co., Hamilton, Ohio. This is a new divisoin which combines the former New England, Eastern and Atlantic divisions. Mr. Deininger has been associated with the company since 1925, serving most recently as manager of the Atlantic division.

ALFRED R. BAYER, engineer's assistant in Brooklyn Union Gas Co.'s development and planning department, has been advanced to assistant engineer. Mr. Bayer joined the company in 1931 and served as laboratory chemist, research chemist and assistant to chief chemist. He has been active in AGA work and reported on several research projects at conventions.

C. FRED LUCAS, vice president in charge of sales, was elected to the board of directors of Florence Stove Co., Gardner, Mass., at the annual stockholders and directors meetings. All officers of the company were re-elected.

ROBERT J. BOND has been appointed president of the Walker-Pratt Manufacturing Co., Watertown, Mass., a subsidiary of Kalamazoo Stove & Furnace Co. He succeeds JOHN E. WYKOFF, who resigned recently.

- OBITUARIES -

M. L. Sperry

MARCY L. SPERRY, 71-year-old president of Washington (D.C.) Gas Light Co., met a tragic death on March 30. Mr. Sperry had resigned his position as president, effective March 30, and was to become chairman of the board of directors. His administration for the past 17 years has been a very successful period in the company's history, according to the utility's executives. Mr. Sperry had been associated with Stone & Webster Service Corp. for more than 30 years before his election as Washington Gas Light's president in 1932.

BLANCHARD SMITH, 45, died recently in Kansas City, Mo. Since 1941 he had been sales representative of the Chaplin-Fulton Manufacturing Co. in the Mid-Continent territory. Mr. Smith had previously represented the Reynolds Gas Regulator Co. in the same area.

P. A. FRYE, secretary and executive officer of the Louisiana Public Service Commission, died suddenly on March 12. He had been a member of the commission since 1932 except for a two-year leave of absence during which he handled work in connection with natural gas conservation for the governor.

ROSS M. CLARK, manager of the San Francisco sales office of American Radiator & Standard Sanitary Corp., died suddenly on March 31 at the age of 60. Mr. Clark had been affiliated with American-Standard in San Francisco and in Los Angeles since 1914.

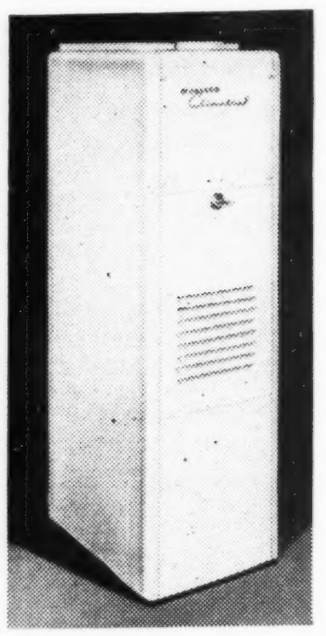
FRANK DEAN BRUCE, 81, retired field superintendent of the Oklahoma Natural Gas Co., died recently after a brief illness.

NEW PRODUCTS

Air Conditioner

L. J. MUELLER FURNACE CO., 2005 W. Oklahoma Ave., Milwaukee, Wis.

MODEL: Climatrol Series 110 gas-fired winter air conditioner.



APPLICATION: Ideal for closet, kitchen, and utility room installations in basementless homes, and low enough for basement installation where required. The small, compact size also makes it particularly suited for individually heated apartments in multi-family dwellings.

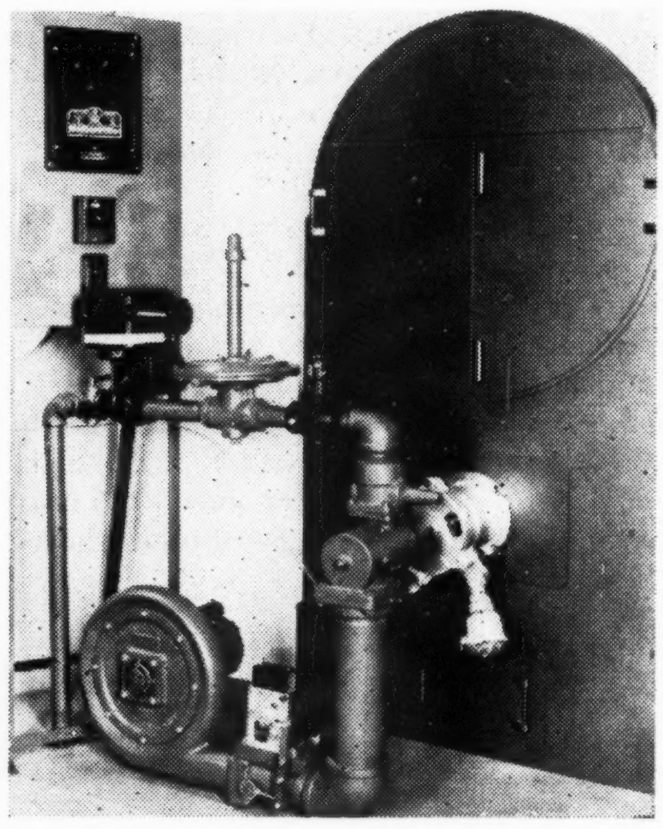
DESCRIPTION: This furnace is AGA-approved for use with natural, mixed, manufactured, or LP-Gas. The unit, available with 60,000 or 80,000 Btu input rating, is designed with filter racks at the bottom so cold air can be brought in through the floor, although side filter racks are also available for bringing cold air in from either side. The blower is a centrifugal type, multi-blade and is mounted on rubber directly beneath the heat exchanger. The drilled-port type cast iron burner has a single-port air shutter.

The furnace is furnished in white or green crinkle lacquer.

Burner Assemblies

BRYANT INDUSTRIAL DIVISION, 1020 London Road, Cleveland, Ohio.

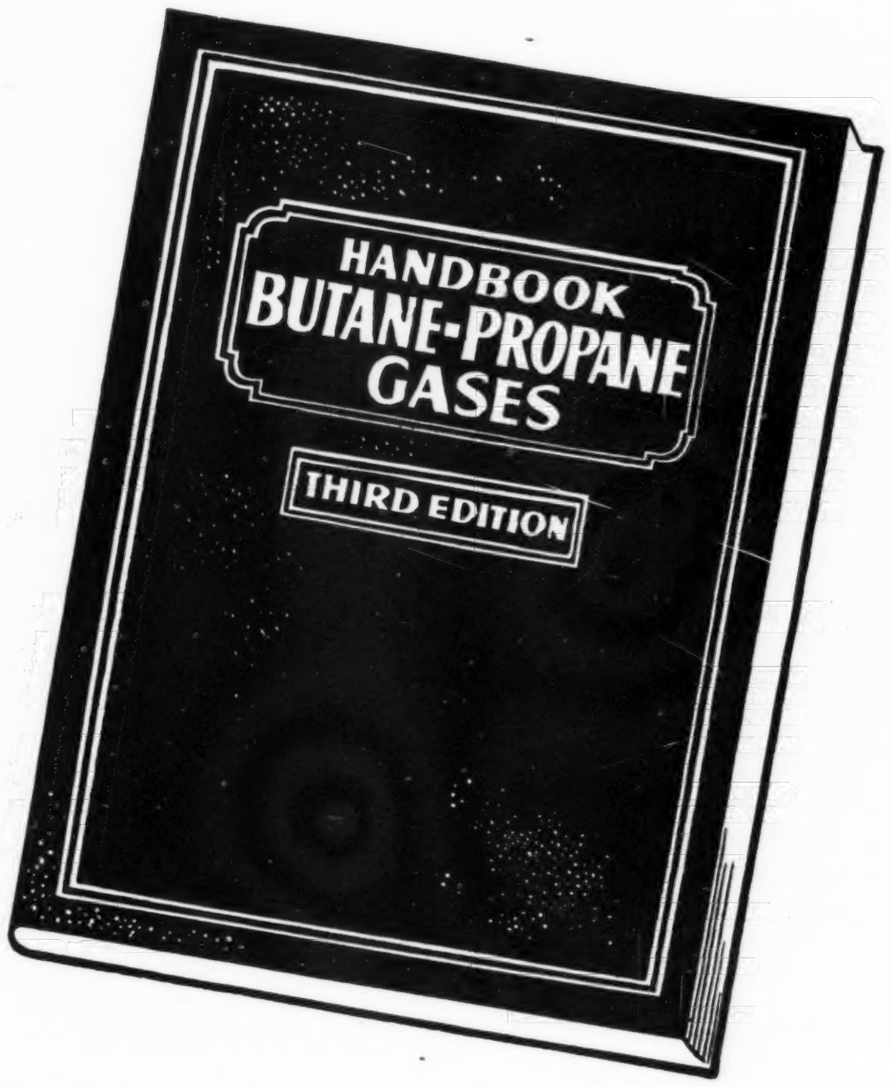
MODEL: Series "BB" boiler burners.



APPLICATION: For gas-fired boilers from 10 to 180 hp, using manufactured and mixed gas or natural and LP-Gas. For replacing or supplementing oil or coal operation.

DESCRIPTION: Only gas piping and electric wiring are needed to complete the installation of the pre-engineered elements of this new series. The burners are shipped as complete packages, including protective equipment and pressure controls.

AGAIN AVAILABLE!



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Proper regulation at the station; in the line; in industrial plants; in the home—for every kind and type pressure control equipment used in the gas industry, there is an especially designed product by Reynolds. Right down the line! From High Pressure to Low Pressure, from one ton to inches W. C., on big jobs or little jobs, one of the Regulators listed below will do a better job on your gas control.

REYNOLDS PRODUCTS

High Pressure Service House Regulators
Straight Lever Type—Model 10-20 Series.
Toggle Lever Type—Model 30 Series.

Low Pressure Service or Appliance Regulators

District Station Regulators
Single or Double Valve, Auxiliary Bowl and Automatic Loading Device Optional.

High Pressure Line Regulators
Pilot Loaded—Pilot Controlled

Toggle Type Regulators
Single Valve, Double Valve, Triple Outlet.

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Automatic Quick-Closing, Anti-Vacuum Valves.

Automatic Shut-off Valves • Vacuum Regulators
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GAS CONTROL SINCE 1892

REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA, U. S. A.

Principal element of the boiler burner is the Pow-R-Sembly, including constant pressure blower, single or double burner nozzles each with compact proportional mixer, zero regulator, motorized air valve, electric ignition pilot, and manual reset safety gas valve. Steam pressure controls, remote thermostatic controls, or both, are furnished in the packaged unit.

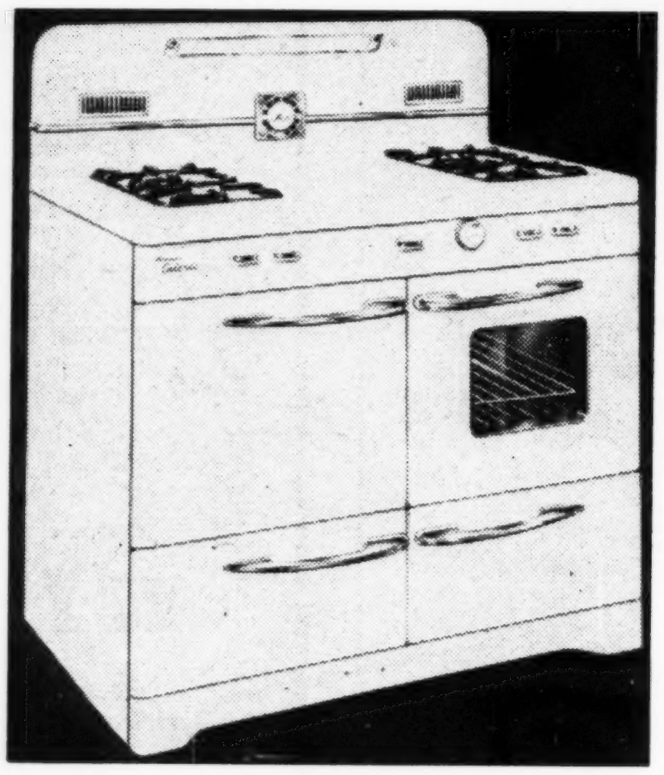
The burners operate automatically over three steps of heat output. For light loads the pilot operates, while the main burner automatically takes over at "low fire" or "full fire" as required.

Domestic Range

CALORIC STOVE CORP., 1242 Widener Bldg., Philadelphia.

MODEL: Ultramatic range with "U" equipment.

DESCRIPTION: Outstanding feature of this new model is a fully enclosed 18-in. fluorescent lamp built into the service panel which is telescoped over the backguard of the present 6000 series models. Known as "U" equipment, the new backguard will be available on 40-in. models only: 6-burner, 4-burner divided, and 4-burner cluster cook tops, in 2-oven or high broiler or standard broiler variations.



CP and non-CP models with Telechron clock and timer are available. There is an optional automatic oven time control on CP models. Height from main top to top of backguard is 11 in., slightly lower than the height of the present fluorescent lamp-equipped models which will be continued in the line.

All models are engineered for use with manufactured, natural, or LP-Gas.

Broiler and Grill

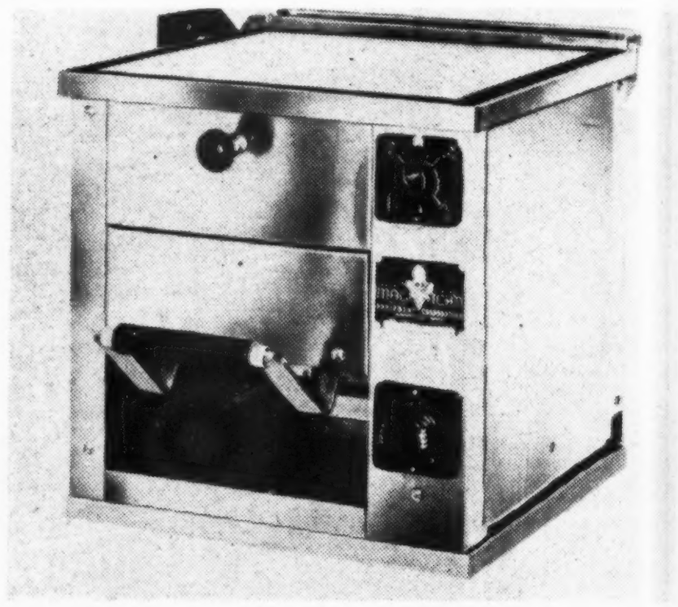
MAGIKITCH'N EQUIPMENT CORP., Quakertown, Pa.

MODEL: MKD-1 Midget char broiler and grill.

APPLICATION: For luncheonettes, restaurants, diners, hotels, hospitals, and other dispensing establishments.

DESCRIPTION: The unit requires a 15½x 15½ in. counter space for efficient installation, but the manufacturer claims that it has all the speed, efficiency and economy of larger models. A generous size top grill for griddle cakes, egg cookery, or bun toasting (operating with waste heat from the broiler) is optional.

Foods are cooked from above and below with radiant heat and without the use of



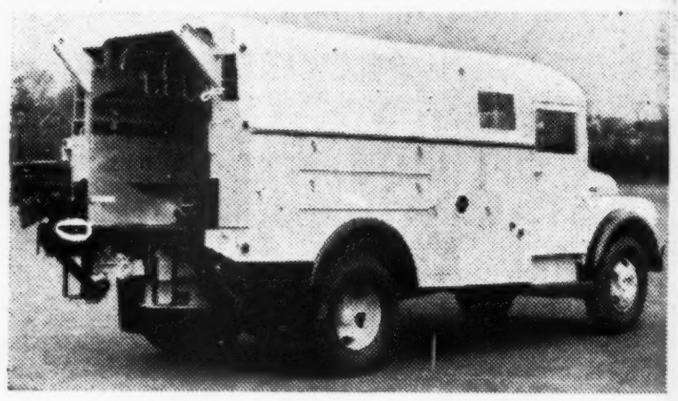
grease or oil. Assorted foods can be cooked at the same time without cross flavoring.

Truck Body

AMERICAN COACH & BODY CO., Cleveland, Ohio.

MODEL: No. 5805 compartment line construction truck body.

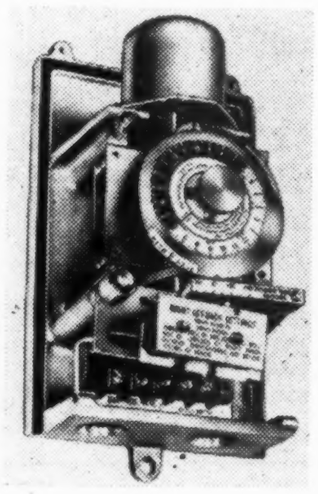
DESCRIPTION: This body replaces model 3714 and mounts on chassis with wide flat faced cowl. The crew compartment carries seven men and is integral with body. Cab is easily accessible from both sides of body, and hinged front seat permits easy entrance to



rear seat. Good visibility, ventilation, and padded seats add to crew comfort. The body is designed to take advantage of the extra space provided by the extra wide hood and fender lines in current truck chassis.

Night Setback Control

WEATHER CONTROLS DIVISION, Automatic Devices Co., 53 W. Jackson Blvd., Chicago.



MODEL: Weather-Chron.

DESCRIPTION: The Weather-Chron provides low cost, fully automatic, "weather actuated" control of night setback of building temperatures. It is wired into the regular room thermostat circuit exactly as any other clock switch would be wired.

Unlike the usual day-night time switch, it is installed on the outside of the building. Instead of setting it for the time heating is to start, it is set to the time the building is to be warm every morning. The shutdown time is set at the earliest time heating may be shut down in the evening in mild (60°F) weather. The Weather-

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of the gas industry

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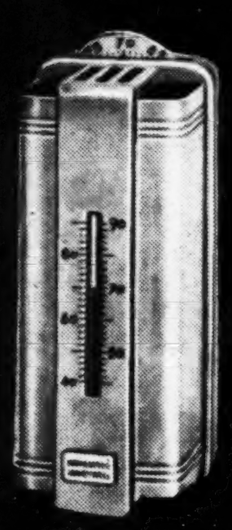
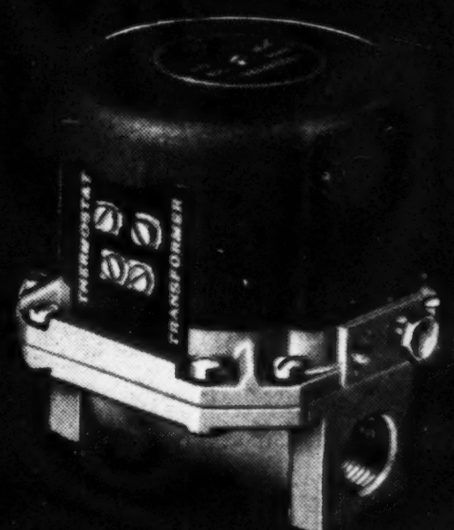
Now.. A "PLUG-IN" Gas Control Package

"TIME-MODULATION" THERMOSTAT





- LOW INSTALLATION COST
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- PRICED TO SELL
- HANDLES HIGH SULPHUR GAS
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NOW you can have the new "Time-Modulation" Thermostat as standard equipment in every "Plug-In" gas control package. For the first time you can now give your customers the temperature control advantages of modulated firing with *your* on-off type burner.

In addition, the "Plug-In" Package brings you powerful new selling features:

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73 BRANCHES FROM COAST TO COAST WITH SUBSIDIARY COMPANIES IN: TORONTO • LONDON • STOCKHOLM • AMSTERDAM • BRUSSELS • ZURICH • MEXICO CITY

Chron anticipates the building's needs for heat and automatically changes the time heating starts each morning and shuts down each evening as the weather changes, starting heating earlier when it is colder outdoors. During the day, the regular room thermostat maintains building temperatures at the comfort level. Where desired, a low night stat may be used as a low limit control.

On extremely cold nights when outdoor temperatures drop below a preselected level, building temperatures will be held at the daytime level throughout the night. When the extreme low is reached after heating has been shut down for the night, heating is started up again regardless of the time. Another important feature is the elimination of all heating in mild weather when outdoor temperatures rise above the 65°F level.

Because of the varying time of morning start-up and night shutdown with the added night safety feature, it is frequently possible to dispense with a night low limit stat. The Weather-Chron can be added at any time and used directly with any thermostatic controls.

Domestic Range

THE ESTATE STOVE CO., Hamilton, Ohio.
MODEL: 4900 Series.

DESCRIPTION: The new Estate ranges have as an accessory the "Converto-Grate" (see illustration), a large burner (more than 1 ft square) for big pressure pans or kettle canning.

Other distinctive Estate features are the "Bar-B-Kewer," a separate meat oven which

can hold whole hams or roasts, leaving the oven free, and the "Hide-Away Grid-All," a large griddle with a flush-to-top cover which folds down to restore the center work surface.

The ranges' four cooking areas—for meat cookery, baking, grilling, and top-burner cooking—may all be used at the same time.

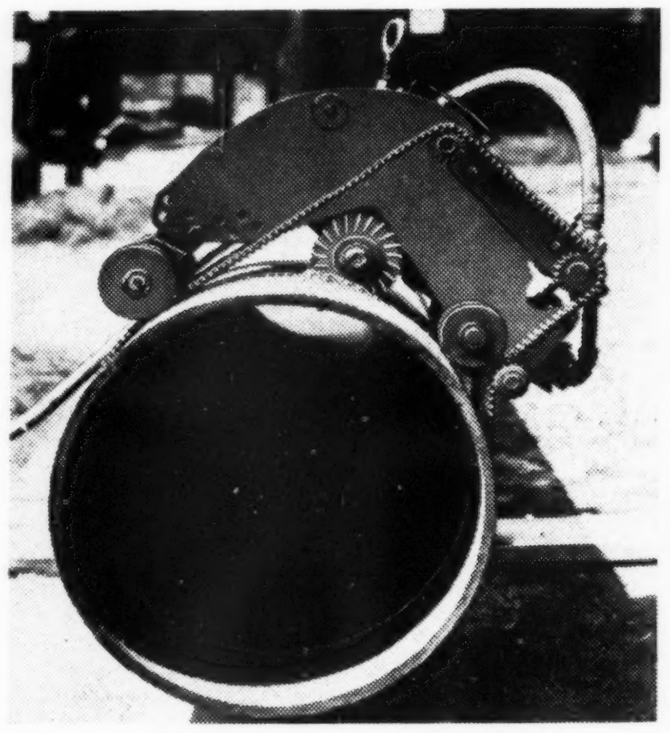
Pipe Saw

THE E. H. WACHS CO., 1525 N. Dayton St., Chicago 22, Ill.

MODEL: Wachs National pipe saw.

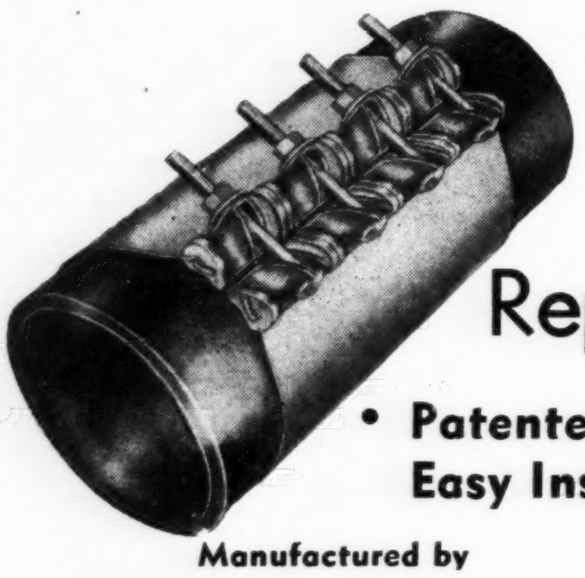
APPLICATION: This portable machine is designed to cut cast iron or steel pipe at a speed of 2 in. per minute. It will handle cuts from 12-in. through 48-in. diameter by adding sections to the chain.

DESCRIPTION: The National pipe saw is powered by an air motor with no flames near the cut. Two men can handle the 200-lb machine and can set it up in approximately 15 minutes. Minimum 14-in. clearance in ditch requires small excavation. Cuts above ground are made with pipe on skids.



The machine is built to stand rough service and has a welded steel body, alloy steel gears and shafts, bronze bushings and ball bearings. Grease seals keep lubrication in and hold out water, sewage, sand, scale and cuttings. A rugged wooden storage case is provided for the machine, chains, tools, and cutters.

A high speed steel milling cutter makes a clean cut through the pipe. The machine travels around the pipe under two silent type chains which hold it tight to the pipe and provide a flexible ring gear for positive feed. A complete cut is made in one rotation around the pipe. Adjustments for pipe sizes are clearly marked. Single screw adjustment sets depth of cut. One screw sets tension on both chains and positive clutch is used for engaging feed.



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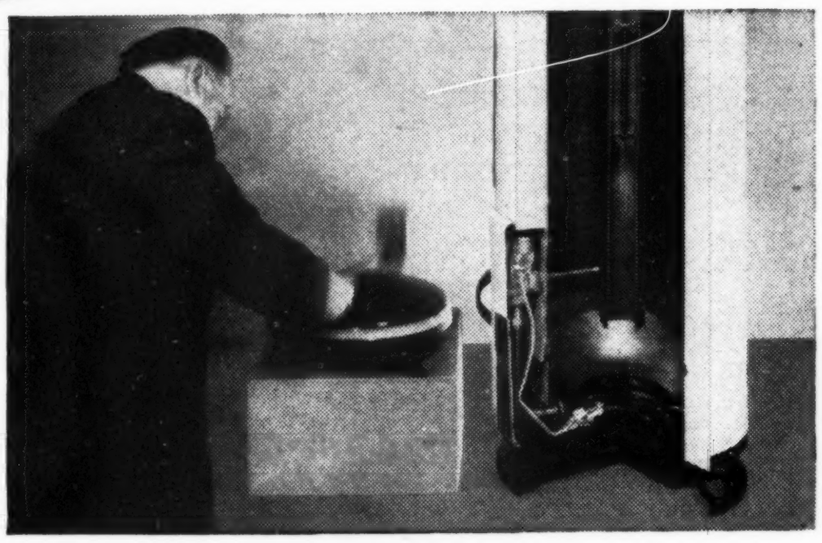


DIAMOND-TOUGH GLASS surface of the bottom head of a *Permaglas* Automatic Water Heater tank withstands repeated blows from a wooden mallet without cracking or chipping! Blurred hand and mallet in this photo show force of impact.

Every dealer has wanted it . . . every dealer has waited for it —the automatic water heater you can DEMONSTRATE!

The Mallet Test, pictured here, is just one of the dramatic, convincing tests *you* can demonstrate for your customers. Head and Mallet Demonstration Sets (H-451) are available to all SMITHway dealers and are included in their liberal 2-for-1 Co-op Ad Plan. This and other tests—matched with the performance records of hundreds of thousands of installed units—are proof that the glass-surfaced steel tank of the *Permaglas* Automatic Water Heater will not crack or chip under use conditions. It is fully guaranteed by A. O. Smith.

This *built-in* protection against destructive rust and corrosion, *engineered* for long life, is the reason "*Permaglas*" is the water heater that CANNOT rust . . . because *glass* cannot rust.

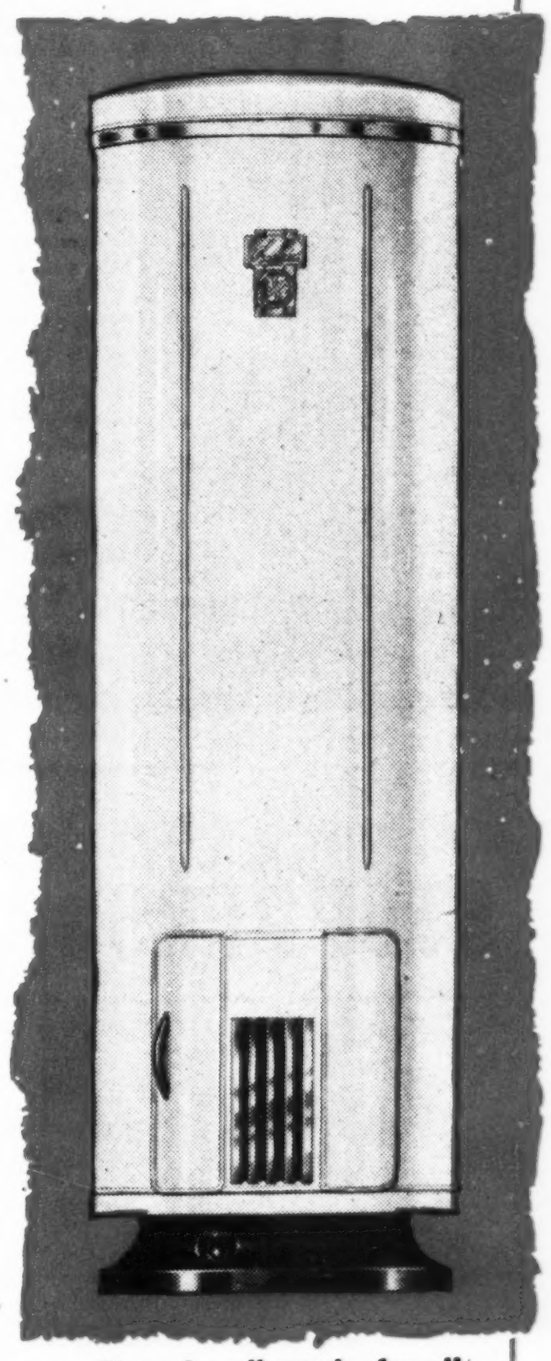
Alert Dealers Display This Emblem

FOR HOT WATER MAGIC GAS has got it!

ONLY PERMAGLAS Automatic Water Heaters provide the lasting rust protection of glass with the strength of steel. Yet this is just one of many research-developed features that make "*Permaglas*" first in completely satisfactory hot-water service . . . and first in sales appeal.

Thermoelectric-type gas control, 100% automatic safe-lighting, is designed to automatically shut off all gas to the heater, should pilot flame ever be extinguished. Standard equipment. Other features, of equal sales advantage, are standard in models for all types of gas.

Be first for automatic water heaters in *your* community with the complete SMITHway Water Heater line! The coupon will bring you all the facts you want to know.



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***Also quality zinc-lined *Milwaukee* and *Duraclad* Automatic Water Heaters**

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SALES SLANTS

Salesmen Ring Doorbells

Convinced that the sellers' market for heavy merchandise such as gas appliances definitely ended in December, 1948, and that competition is growing keener, 1200 dealers on April 1, put 800 salesmen to work ringing doorbells all over Oklahoma asking housewives to buy shiny new automatic gas ranges. Some of this urge to enter the buyers' market also came from manufacturers of appliances.

The Oklahoma Natural Gas Co., Tulsa, helped to kick off this statewide "Gas Has Got It" range campaign by giving March-end dinners to dealers in each of its nine districts and by furnishing general sales and advertising plans. The company also made available to dealers its showrooms and lobbies for display of merchandise, and its home service department was at all times available for assistance and demonstrations. To dealer salesmen who met or exceeded certain quotas, beautiful and valuable prizes were awarded.

Commenting on the campaign John A. McMullin, Oklahoma City district sales manager, said: "Since Dec. 1 there has been a lag in the movement of heavy merchandise. We realize that we must ring doorbells and resume some of the old practices of merchandising to keep up sales volume."

The campaign continued all through the month of April with two days added for closing sales. It included taking the field and telling the housewife more than 50 reasons why "Gas Has Got It" as well as an intensive newspaper and radio advertising campaign.

AMERICAN STOVE CO., St. Louis, has launched an extensive advertising and sales promotion campaign to stimulate the sale of Magic Chef gas ranges. Lloyd C. Ginn, advertising and sales promotion manager, presented the campaign to salesmen in regional meetings at St. Louis, New York, Cleveland, Chicago and San Francisco.

Under a new cooperative advertising plan, American Stove will help dealers with their newspaper, radio, billboard, and car card advertising; special direct mail campaigns; indoor and outdoor store displays; and convention exhibits. The previous plan covered newspaper advertising only. Mats and radio spot announcements are furnished free.

Spring national advertising for Magic Chef is appearing in *Better Homes and Gardens, Country Gentleman, Good Housekeeping, Ladies' Home Journal,* and *Saturday Evening Post.* Advertising is also being run in 14 trade magazines.

Sales promotion includes a variety of store traffic builders, premiums, counter and direct mail literature, window and showroom displays, indoor and outdoor electric signs, road signs, and billboard posters. Most promotion material may be bought under the cooperative advertising plan.

The entire program is being presented to dealers by means of a portfolio titled, "The Story of the Gas Range Business." It gives a resume of business the past few years, analyzes present market conditions, and explains how to sell in a buyers' market. It also shows the products and promotion campaign with which Magic Chef intends to hold first place in sales.

BROOKLYN UNION GAS CO. introduced its 1949 sales campaign on gas ranges and gas water heaters at a series of plumber-dealer meetings in the New York metropolitan area. More than 1100 dealers attended four meetings where the "All-American Prize Fight Contest" was explained. Speakers wearing boxing gloves and striped bathrobes outlined the plan providing for a liberal commission for selling specified gas ranges and water heaters, as well as additional prizes to be earned by merit points obtained with each sale. Sales goal of the utility's seven-month promotion is to double the $5 million worth of ranges and water heaters sold last year by BU dealers and salesmen.

HAMILTON MANUFACTURING CO., Two Rivers, Wis., has appointed two new distributors for the Hamilton automatic clothes dryer. Electronics Distributing Co., Atlanta, Ga., and The National Rose Co., Memphis, Tenn., will handle the appliance in their respective territories.

AGA national ads for June will feature graduation hats and the caption, "Top Honors." Newspaper mats of the ad are now available from the National Advertising Committee at AGA headquarters.

WELSBACH IHF VALVES
put the finger
on faulty thermostats!
IHF-
22B
WELSBACH (KITSON) IHF emergency gas shut-off valves cut off main gas supply *before* dangerous temperature is reached . . . *keep* it shut off until trouble is repaired. When safety limit is reached, patented chemical fuse melts, closes valve, shuts off all gas to burner. New cartridge easily, economically replaced.
Manufactured to high, precision standards expected from Welsbach-Kitson products. Your reputation safeguarded by our three-quarters of a century experience!
. . . YOU GAIN:
Tank stress eliminated
No messy cellars to clean!
Easy, quick installation!
A.G.A. listed!
Fewer customer complaints!
. . . YOUR CUSTOMERS GAIN:
Complete satisfaction!
Utmost safety!
No water wastage!
EMERGENCY GAS
SHUT OFF VALVE TYPE IHF
Pipe to Thermostat on Heater, if any. If not, then to burner direct.
Gas Supply
Cold Water Inlet
Hot Water Outlet
write . . .
THE WELSBACH CORPORATION
KITSON DIVISION
1500 Walnut St., Philadelphia 2, Pa.

STOPPERS | *Since 1897*

ALL KINDS OF PIPE STOPPERS

Safety Gas Main Stopper Co.

523 ATLANTIC AVENUE • BROOKLYN 17, N. Y.
CABLE ADDRESS: GASTOPPER, N. Y.

GOOD SERVICE IS GOOD BUSINESS

Here's how A.O. Smith helps you give faster, better service on SMITHway Water Heaters

Good service means good business . . . and to give your customers good service requires an adequate stock of parts, always ready on demand.

That's where the A. O. Smith Replacement Plan for parts on all SMITHway Water Heaters helps you be *"first for service"* in your community. Out of three convenient Product Service Division Branches—Los Angeles, Chicago, and metropolitan New York—A. O. Smith provides 24-hour, off-the-shelf service on parts for all SMITHway Water Heaters . . . *Permaglas, Duraclad,* and *Milwaukee.*

No waiting for repairs. All parts are shipped immediately. Each part carries a full one-year warranty.

Let us give you full information and service literature on SMITHway Products in which you are interested.*

●

FASTER MOTOR SERVICE. The same speedy service is also available on SMITHway Electric Motors. Write the nearest office for all the facts . . . now!

1ST

A. O. Smith is first again with so complete a replacement plan. One more reason SMITHway Water Heaters are first in *profit* opportunities for you!

HOW TO MAKE THIS PLAN WORK FOR YOU:

Dealers secure replacement parts from their distributors.

Distributors and Utilities are served direct by the nearest Product Service Division Branch (see addresses below).

All save time, paper work, and money. Good service is easy!

A.O. Smith SMITHway SERVICE

A. O. SMITH Corporation

PRODUCT SERVICE DIVISION*

EASTERN	CENTRAL	WEST COAST
825 Lehigh Ave. Union, N.J.	8312 South Chicago Ave. Chicago 17	1637 N. Spring St. Los Angeles 12

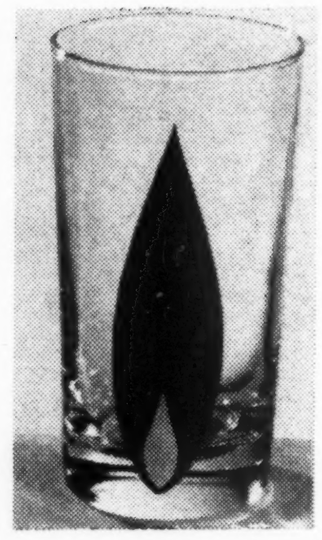
**Also serving these SMITHway Products: Motors, Liquid Gas Systems, Vertical Turbine Pumps, Stokers, SMITHway-Burkay Water Heaters and Burkay Heating Equipment*

SERVEL INC. has issued a new sales portfolio which will be the basis of a promotion campaign designed to tie in with GAMA's Court of Flame sales contest. The portfolio contains a complete sales and promotion plan for Servel's water heater line, including the Mainliner ball-type tank heater; the upright, medium-priced, fast-recovery Highliner model; and the Headliner, Servel's entry in the lowest priced field.

A five-step plan, geared to help gas appliance dealers sell every water heater prospect, is suggested in the kit. The first step, according to R. J. Canniff, advertising and sales promotion manager, is the sales seminar which offers a comprehensive course of sales training on the full line of water heaters. The second step is a local advertising program with mats for newspaper advertising and spot announcements for use in radio.

A series of window and floor displays designed to increase showroom traffic and prospect interest is labeled step three, and the fourth part is a collection of printed materials for consumer, commercial and building industry distribution.

Tested sales tools which help the salesmen close sales and turn the prospect into a buyer are the basis of step five. These include the salesman's visualizer, model sheets, and the Servel water heater quiz kit which sparks up a sales talk with entertainment and aids the salesman and the prospect in choosing the proper size of heater for the job.



GAMA's blue flame tumblers, produced as a gag for last year's AGA convention, have become a popular item and more than 8400 glasses are reminding customers of the advantages of gas cookery. The flame is silk screened on a heavy bottom, 11-oz. tumbler, 5¼-in. high. Blue flame tumblers in sets of eight are available for $2 a set from GAMA headquarters.

AIR REDUCTION PACIFIC CO., a subsidiary of Air Reduction Co. of New York City, has announced availability of a new reprint titled "The Economies of Hardsurfacing." Written by J. J. Barry and Albert Muller, the article reviews the advantages of hardfacing and offers an analysis of the problems leading to the correct selection of the proper hard-facing rods. Design and cost figures and a selected bibliography are included. Copies may be obtained from any Airco Pacific office.

H. CARL WOLF, AGA managing director, reports that gas and gas appliance sales, which reached record levels in 1948, will probably exceed the best pre-war sales records during 1949. Utility companies are most optimistic in their forecasts, Mr. Wolf said. A number of companies recently surveyed by AGA expect to equal or surpass last year's sales. Most of the remaining companies estimated sales of all appliances would be 5% to 10% less than in 1948, an all-time peak year.

There is nothing like

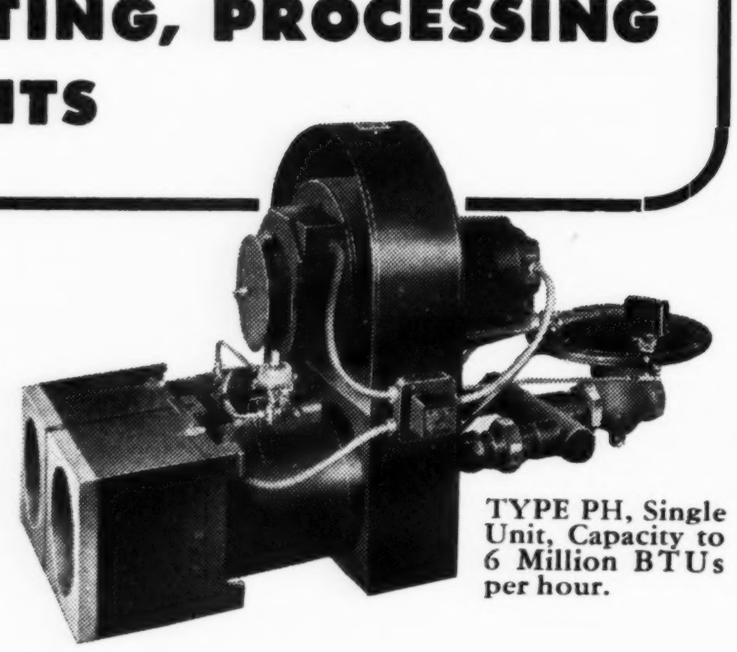
NORDENSSON

Forced or Natural Draft

GAS BURNERS

FOR LARGE HEATING, PROCESSING OR POWER PLANTS

Here's why!



TYPE PH, Single Unit, Capacity to 6 Million BTUs per hour.

First cost is nominal! Operating cost is reasonable! High efficiencies are assured! Dependability is guaranteed! Wherever a complete factory assembled unit with endorsed combustion safeguards is demanded, specify a NORDENSSON with complete confidence that its performance will justify your judgment. ROBERTS-GORDON APPLIANCE CORP., 137 Arthur St., Buffalo 7, N. Y.

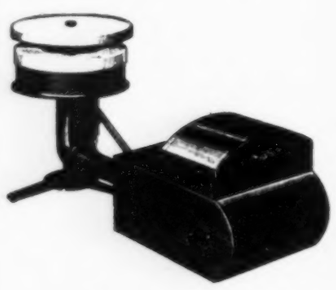
CATALOGS

BAILEY METER CO., 1050 Ivanhoe Rd., Cleveland 10, Ohio—Bulletin No. 163-B explains the use of diaphragm operating units for measurement of pressure, draft or differential. Some of the many standard ranges available are listed. Described in detail are four styles of casings, all of which are available in sizes to accommodate from 1 to 12 units. Data include net and shipping weights plus complete dimensions of casings. The bulletin has numerous illustrations — photographs, diagrammatic drawings, and cut-away drawings.

T. D. WILLIAMSON INC., Tulsa Okla.—Catalog 48, "Pipe Line Specialties," is a 16-page, completely illustrated brochure which shows the diversity of applications for which the company's cleaning tools are designed and useful applications for their other pipeline specialties. The firm has also issued two other new bulletins. No. 148 discusses cutting and welding jigs for the pipeliner and fabricator, and Bulletin 301 describes the pipeliners' tapping machine, Hillco Model 600.

SURFACE COMBUSTION CORP., Toledo 1, Ohio—This company has issued a new industrial gas burner catalog describing high and low pressure equipment for all common gaseous fuels. Divided into 10 sections and containing over 130 pages, the catalog is designed as a ready reference source for all engineers concerned with the specification and

There is a ROBERTS-GORDON UNIT ... For Every Furnace or Boiler



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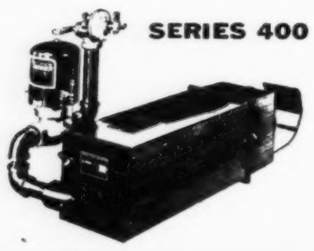


SERIES 400

design of gas combustion equipment. In addition to presenting more than 60 types of burners in 600 sizes, the catalog contains much practical data on selection of burners for most industrial heating services with various gaseous fuels. A useful engineering data section on furnace design and heat input requirement calculations has also been included.

THE NATIONAL RADIATOR CO., Johnstown, Pa.—Catalog No. 542 is a new four-page manual providing information on the many useful facts relative to the sale and installation of the new "22" Series gas boiler. The new literature shows both full and cutaway views of the gas boiler which is available in six sizes. Complete roughing-in dimensions are shown in addition to useful tables of boiler ratings and other data for natural, manufactured, mixed, and LP-Gases. The "22" Series boilers have cast iron sections and are AGA approved.

AMERICAN VENTILATING HOSE CO., 15 Park Row, New York 7, N. Y.—Catalog No. 30 describes this firm's lightweight flexible hose products. Featured are the following: Flexaust—a lightweight, strong, flexible, spiral wire reinforced hose for numerous applications; Portovent—a ring-reinforced, retractable hose with exceptional flexibility; and Bloflex—a non-reinforced, collapsible hose for blowing only. The catalog includes installation and engineering data and price list.

OWENS-CORNING FIBERGLAS CORP., 16 East 56th St., N. Y.—A new 28-page catalog entitled "Corrosion Control for Underground Pipe" describes methods to protect underground pipelines from corrosion and the role of Fiberglas pipe wrap in corrosion control. Test data on the properties and performance of Fiberglas pipe wrap are included. The manual is illustrated with charts and photographs. Copies may be obtained from Owens-Corning at Toledo 1, Ohio.

CRANE CO., 836 S. Michigan Ave., Chicago.—Circular No. 320, "Corrosion-Resistant Piping Materials," presents information on the complete Crane line of valves, fittings, fabricated piping and pipe coils to meet a wide range of corrosive conditions. This 32-page circular also contains eight pages of condensed recommendations, description of alloy materials, and corrosion questionnaire.

HOSE ACCESSORIES CO., Philadelphia, Pa.—Catalog No. 149 describes the company's complete line of "Le-Hi" hose couplings, hose clamps, air valves and manifolds. The safety locking universal coupling, with exclusive self-locking springs, is a featured item.

CURRENT READING

The following three items are summaries of reports presented at the 55th annual meeting of the American Society of Heating & Ventilating Engineers at Chicago in January.

PERFORMANCE OF FOURTEEN MASONRY CHIMNEYS Under Steady State Conditions—by P. R. Achenbach and S. D. Cole of the National Bureau of Standards. This is a report of tests conducted by the bureau to determine the performance of 14 chimneys of various types of construction under conditions simulating those obtained in domestic chimneys. Tests were made at 200, 600 and 1000 F inlet temperature, and at gas flow rates of 20, 45 and 70 cfm, corresponding to a fuel burning rate of ½, 1 and 1½ gal of fuel oil per hour, respectively.

The constructions selected for the various chimneys permitted comparison of brick chimney performance with others in which such materials as shale tile, cinder concrete blocks and the fire clay or metal liners were used. All chimneys were approximately 15.5 ft high from inlet to top, and were exposed above the roof for one-third of the height.

Conclusions drawn from tests provide useful information for selection of chimney material and type of construction.

PERFORMANCE OF RESIDENTIAL CHIMNEYS—by L. B. Schmitt and R. B. Engdahl of Battelle Memorial Institute. This study was conducted at Battelle for Bituminous Coal Research Inc., the objective being to obtain information on small residential chimneys for hand-fired heating equipment.

Four different types of residential chimneys were tested for performance under laboratory conditions. Some tests were run with simulated wind over the chimney top. Chimney performance varied only slightly with the differences in construction tested. Wind effects were large under some conditions, and were only partially counteracted by the chimney ventilator tested.

Recirculation of gases in the chimney and its effect on performance are discussed. A

ARCCO
The World Over
wherever there is gas
ARCCO-ANUBIS
'Dry-Air GAS
GRAVITOMETERS
This new Arcco-Anubis Dry Air Gas Gravitometer determines and records specific gravity of gases automatically corrected to the humidity content of the air. The difference in weight between a column of GAS and equal column of DRY AIR is measured. This ratio represents the true specific gravity of the sample.
One bell of the instrument is filled with gas which is being measured, and the other bell is filled with dry air. Otherwise, except for the new instrument having one column for gas and one column for dry air, the unit is identical in operation to the standard gas gravitometer. When calibrated and properly installed, these instruments require little attention other than to wind the clock, ink the pen, and change the chart. Send for bulletin No. 101.
AMERICAN
RECORDING CHART CO.
3113 E. 11th St. • Los Angeles 23, Calif.
Available for Early Delivery
SEND FOR BULLETIN NO. 101

method for calculation of available draft for a small residential chimney is given.

OVERALL HEAT TRANSFER COEFFICIENTS for Flat Glass Determined Under Natural Weather Conditions—by G. V. Parmelee and Warren W. Aubele of the ASHVE research laboratory. Data are given for tests made under natural weather conditions on single sheets of glass and on two sheets spaced ¼ in. apart. Tests were made with the glass exposed to wind velocities of from 3 to 9 mph and with the glass sheltered from the wind. Surface conductances have been analyzed and show the separate influence of convection and radiation, the latter including nocturnal radiation effects. Comparisons are made with guarded hot box test data.

HANDBOOK OF CHEMISTRY AND PHYSICS—31st edition, edited by Charles D. Hodgman of Case Institute of Technology, and published by The Chemical Rubber Co., 2310 Superior Ave., Cleveland 14, Ohio. The book contains 2756 pages, 4½ x 7 in., and with cloth binding the price is $6.

Compiled in five sections, the handbook includes complete mathematical tables, properties and physical constants of the elements, properties of organic and inorganic compounds, chemical tables, tables of specific gravity, properties of matter, heat and hygrometry, sound, electricity and magnetism, light, conversion tables, photographic formulae, table of plate and film speeds, and a vast amount of other important data.

Much new material appears in the 31st edition. A table of logarithms of decimal fractions has been added, and a table of squares of the sine and cosine and their product. The former table of arrangement of electrons in orbits has been replaced by a table of electronic configuration of the elements. In step with the trend toward more intensive study of nuclear physics, a table of isotopic masses has been included, as well as a table of wave lengths of the principal lines in the emission spectra of the elements. This table is taken from data only recently available. Complete revisions and new material added to the handbook amount to 180 pages.

LETTER SYMBOLS FOR PHYSICS—Prepared by the American Standards Assn. and published by the American Society of Mechanical Engineers. The bulletin is designated as ASA Z 10.6-1948. This standard was prepared by Subcommittee No. 10 on Physics, one of 12 subcommittees appointed by Sectional Committee Z10 on Letter Symbols and Abbreviations for Science and Engineering. The work was sponsored by five organizations—the American Society of Civil Engineers, American Institute of Electrical Engineers, American Society for Engineering Education, The American Society of Mechanical Engineers, and American Assn. for the Advancement of Science. Price of Z 10.6 is $1.

1948 GAS MEASUREMENT COMMITTEE REPORT NO. 2—The Gas Measurement Subcommittee of the Technical Research Committee of the AGA Natural Gas Department has prepared this revised edition which is available from AGA headquarters at $1.50 a copy.

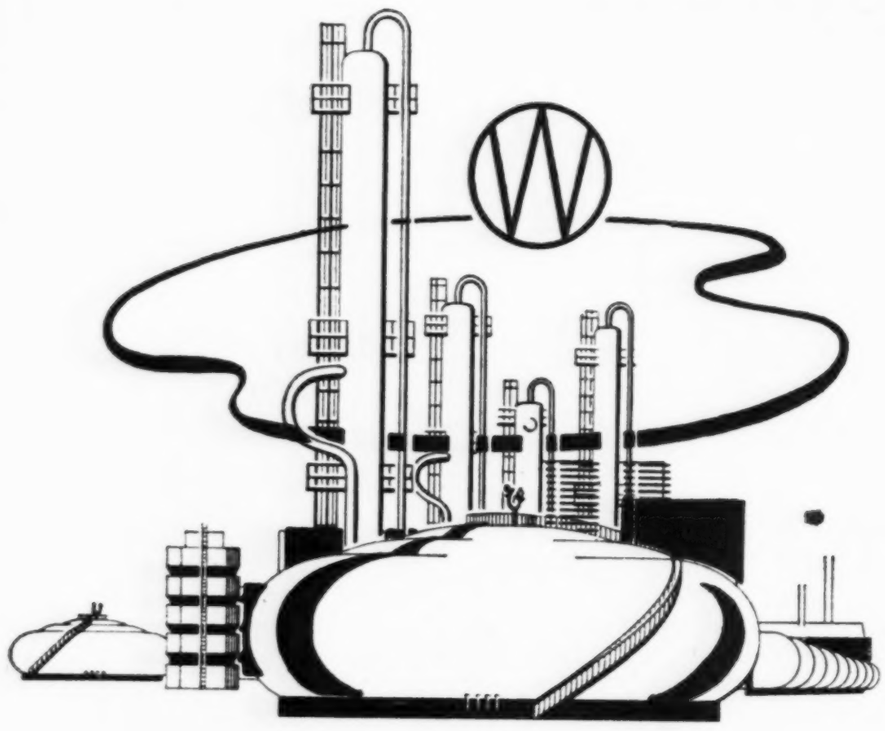
Originally issued in 1935 and reprinted in 1945, the report contains recommendations covering the use of orifice meters in the measurement of natural gas. An errata sheet with corrections included in the new edition will be sent free of charge to persons who wish to bring the 1945 edition up to date.

CAUSES OF FROSTING OR DULLING OF FINISHES—AGA Information Letter No. 30. This bulletin has been prepared by the Subcommittee on Metal Finishing, of which C. George Segeler is chairman. Causes are given for the flat frosted or dull finishes which occasionally result on material treated in an industrial finishing oven, instead of the glossy surface which was intended. Methods are pointed out for correcting these causes and obtaining successful results from all types of finishing ovens.

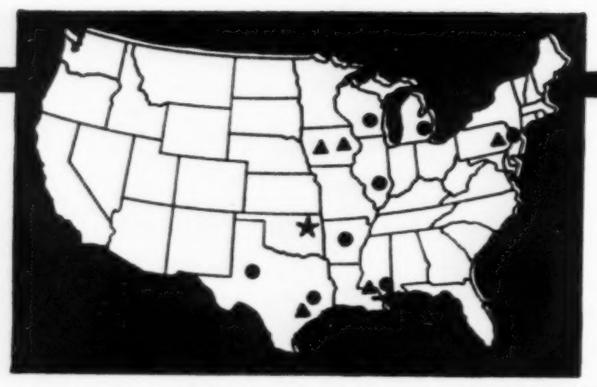
ASHVE BIBLIOGRAPHY — The American Society of Heating & Ventilating Engineers has issued an extensive bibliography on the subject of panel heating. It contains over 330 references and in many cases a brief abstract or critical review. The list was compiled by C. M. Humphreys, senior engineer of the society's research laboratory at Cleveland, Ohio, with the assistance of Miss Doris M. Dietz, of the laboratory staff. It is available to nonmembers at 50 cents per copy.

BENTON UNIT CYCLING PLANT—by H. W. Manley, of Barnsdall Oil Co. The article, which is a step-by-step description of the processing and equipment layout of this cooperative enterprise, has been printed in a 10-page bulletin by Clark Bros. Co. Inc., Olean, N. Y.

NO LP GAS IS BETTER



BUTANE AND PROPANE



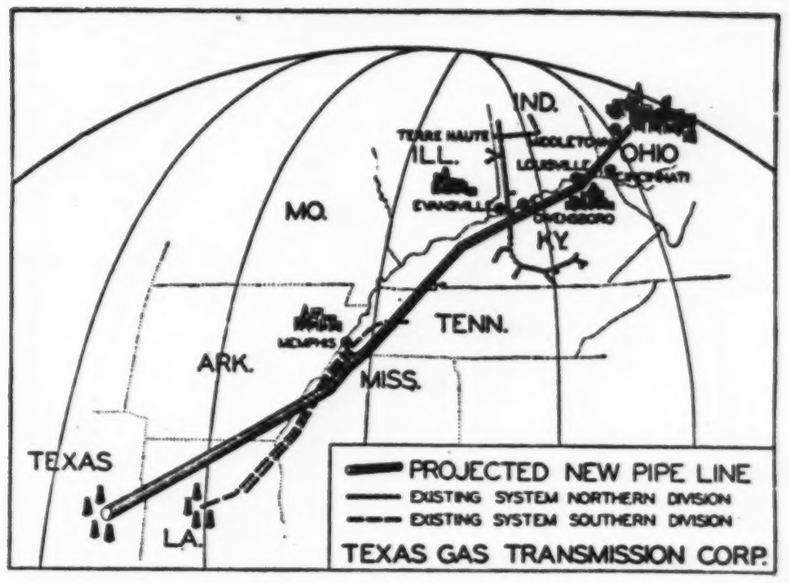
LOCATIONS OF WARREN LPG TERMINALS AND OFFICES

And no LP Gas is in more dependable supply! We have expanded our production of Butane and Propane to fill the needs of our regular and the many new customers who have turned to Warren for a quality product in reliable supply. Production is obtained from over 45 plants. Our recently enlarged fleet of high pressure tank cars, and the SS "Natalie O Warren" provide adequate transportation. Warren LP Gas storage terminals at Newark, Houston, Texas City, Mobile, Little Rock, Des Moines and Cedar Rapids assure you of ample stocks on hand at all times to fill your needs.

OFFICES: TULSA, OKLA.
DETROIT • HOUSTON
MOBILE • MIDLAND, TEX.
NEWARK • FT. WORTH
MT. VERNON, ILLINOIS
MADISON, WISCONSIN

WARREN

Texas-Ohio Line To Be In Operation Next Winter



ANOTHER inoculation against old man winter is in store for gas users in the east north central sector of the United States before the year is ended, with FPC's recent approval of the fourth major post-war line into the area. Texas Gas Transmission Co., which by virtue of the commission action joins the ranks of the "big inches" among gas pipeline companies, will take 400 MMcf per day 800 miles from Texas and Louisiana to a point near Middletown, Ohio, through a $73.5 million, 26-in. line under terms of the certificate.

Already, impact of the added volumes in the curtailment ridden areas is hinted. East Ohio Gas Co., Cleveland, which will receive 110 MMcf per day of this gas through a linking line simultaneously approved for construction by Texas Eastern Transmission Corp., was the first to announce that it would be able "adequately to take care of domestic and commercial demands" next winter. It immediately petitioned the Ohio Public Utilities Commission for approval to permit 20,000 new house heating installations before the next cold season.

Texas Eastern, which will haul the major portion of the gas—235 MMcf—from the Texas Gas terminus to distributing companies, was permitted to build 177 miles of 26-in. line extending eastward from a point of connection with Texas Gas' line near Middletown for this purpose. Also included in the combined dockets certification was a system of loops and extensions near the Texas Gas line's source, to be built by Texas Eastern to enable it to send 200 MMcf through Texas Gas' line, bringing Texas Eastern's total estimated outlay to $24,052,000.

Thus, the total project qualifies to be termed a hundred-million-dollar line.

Source and Outlets

Here's the lineup on where the gas will come from and where it will eventually be consumed:

Texas Eastern will put in 200 MMcf at a connection with the new line at Lisbon, La., through a 100-mile extension of the Little Inch line in Texas, 33 miles of loop line near Beaumont, Texas; 36 miles of loop between Castor and Lisbon, and additional compressor facilities.

Texas Gas will send gas from the Carthage field in east Texas through 110 miles of 20-in. line to Lisbon, whence 723 miles of 26-in. line will carry the full 400 MMcf toward Middletown. Along the way volumes will be delivered through existing lines and a 32-mile lateral in Indiana from Madisonville to Evansville. Helping to boost the gas along will be 10 compressor stations with an initial horsepower aggregate of 68,800.

A large share of the gas will be distributed along the way. The FPC has ordered the following allocations to the following companies: Kentucky Utilities Co., Paducah, 2.5 MMcf; Dyersburg, Tenn., 300 Mcf; Tennessee Gas Co., Union City, 1 MMcf; and Louisville Gas & Electric Co., 20 MMcf the first year, 30 the following, and 40 thereafter. In addition, Memphis Light, Gas & Water will receive 50 MMcf. In Indiana, Madison Utilities Corp. will receive 800 Mcf and Lawrenceburg will get 2 MMcf.

From the Middletown connection, Texas Eastern will deliver 110 MMcf to East Ohio; 100 MMcf to Ohio Fuel Gas Co., Columbus, and Manufacturers Light & Heat, Pittsburgh; 18 MMcf to Philadelphia Gas Works Co.; 2 MMcf to Consumers Gas Co., Reading, Pa.; 2.5 MMcf to Allentown - Bethlehem (Pa.) Gas Co.; and 3 MMcf to Harrisburg (Pa.) Gas Co.

Texas Eastern had asked that all its

(Continued on page 120)

Map of Texas Gas' line from Carthage to Middletown. Not shown are lines to be built by Texas Eastern to put 200 MMcf into system at Lisbon, La., and take out 235 at Middletown for transport to Columbus, Cleveland, and Pennsylvania cities.

MAJOR GAS PIPELINE ACTIVITY - - 1948

(For key, see opposite page)

WASHINGTON
MONTANA
NORTH DAKOTA
MINNESOTA
MAINE
OREGON
MICHIGAN
WISCONSIN
VT.
NEW YORK
MASS.
CONN.
CALIFORNIA
NEVA
UTAH
NEBRASKA
IOWA
ILLINOIS
INDIANA
PENNS NIA
COLORADO
KANSAS
MISSOURI
ARIZONA
NEW MEXICO
OKLAHOMA
TEXAS
ARKANSAS
TENNESSEE
KENTUCKY
VIRGINIA
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
LOUISIA
MISSISSIPPI
FLORIDA

4 11 19 17 5 9 38 31 20 13 14 26 40 18 8 6 29 1 28 12 34 10 23 37 21 3 36 39 30 35 27 33

Key to Major Gas Pipeline Activity - - 1948

Construction of 1,000 miles or more of gas transmission lines.

1. Columbian Fuel Corporation, Texas Eastern Transmission Corporation and Tennessee Gas Transmission Company lines from Louisiana to Ohio, Kentucky and West Virginia.
2. Michigan Consolidated Gas Company lines from Texas to Michigan.
3. Natural Gas Pipeline Company of America lines from Texas to Illinois.
4. Panhandle Eastern Pipe Line Company lines from Texas to Illinois.
5. Phillips Petroleum Company lines from Texas to Illinois.

Construction of 500 to 1,000 miles of gas transmission lines.

6. Carolina Pipeline Company lines from Kentucky to North Carolina.
7. Columbia Gas System lines from Kentucky to Pennsylvania.
8. Columbian Fuel Corporation lines from Kentucky to North Carolina.
9. Consolidated Natural Gas Company lines from Kentucky to New York.
10. Delhi-Taylor Oil Corporation lines from Texas to Louisiana.
11. Empire Gas and Fuel Company lines from Texas to Nebraska.
12. Georgia Natural Gas Corporation lines from Louisiana to Georgia.
13. Kentucky Gas Transmission Company lines from Texas to Kentucky.
14. Manufacturers Light and Heat Company lines from West Virginia to Pennsylvania.
15. Mississippi River Fuel Corporation lines from Louisiana to Missouri.
16. Missouri Pacific Gas Transmission Company lines from Texas to Missouri.
17. Natural Gas Pipeline Company of America lines from Texas to Illinois.
18. Ohio Fuel Gas Company lines from Texas to Ohio.
19. Peoples Natural Gas Company lines from Texas to Iowa.
20. Philadelphia Gas Works lines from Pennsylvania to Pennsylvania.
21. Phillips Petroleum Company lines from Texas to Oklahoma.
22. Rural Gas Corporation lines from Louisiana to Missouri.
23. Southern California Gas Company lines from California to California.
24. Southern Natural Gas Company lines from Louisiana to Georgia.
25. Tennessee Gas Transmission Company lines from Louisiana to Tennessee.
26. Texas Eastern Transmission Corporation lines from Louisiana to Pennsylvania.
27. Texas Gas Transmission Corporation lines from Louisiana to Kentucky.
28. Transcontinental Gas Pipe Line Corporation lines from Louisiana to Georgia.
29. Transcontinental Gas Pipe Line Corporation lines from Louisiana to North Carolina.
30. Transcontinental Gas Pipe Line Corporation lines from Louisiana to Louisiana.
31. United Gas Corporation lines from Louisiana to Pennsylvania.
32. United Gas Pipe Line Company lines from Louisiana to Louisiana.
33. Valley Gas Transmission, Inc. lines from Texas to Texas.
34. Warren Petroleum Company lines from Texas to Oklahoma.
35. Western Gas Company lines from Louisiana to Louisiana.
36. Western Natural Gas Company lines from Texas to Arkansas.
37. Westmoreland Natural Gas Company lines from Texas to Texas.
38. Worthington Pipe Line Corporation lines from New York to Massachusetts.
39. Wyatt Gas Company lines from Louisiana to Tennessee.
40. Yount-Hill Gas Company lines from Texas to Ohio.

KEY TO THE MAP:

Pipeline Plans and Programs

The 40 companies listed here had pipelines either under way or approved by the FPC during 1948. Numerous other major projects were also programmed, but most of them were for appurtenant equipment only. Some of the lines shown here are still awaiting delayed pipe shipments before construction can begin. Map compiled by the staff of GAS.

1. ALABAMA-TENNESSEE NATURAL GAS CO.'s Florence, Ala., line from near Selmer, Tenn., connects with Tennessee Gas' 24-in. line, 130 miles to Huntsville, Ala., approved by FPC in 1948. Construction to start in July; completion in December. Cost, $5.4 million.

2. CHICAGO DISTRICT PIPELINE CO. line approved in January, 1947, will practically loop original lines. Portion between Joliet and westerly city limits of Chicago, near Peoples' Crawford station, was completed last November. It may be 1951 before 41 miles between Joliet and southerly city limits of Chicago near People's Calumet station are finished. Cost, $4,810,000.

3. CITIES SERVICE GAS CO., Oklahoma City. Line approved in June, 1947. "Southern trunk," 44-mile line, completed last year, as was westerly 258 miles of Hugoton-Kansas City line; remaining 129 miles, from point north of Newton, about to get under way, with completion in the fall. Cost, $17.8 million.

4. COLORADO-WYOMING GAS CO. Line approved in 1947 from Colorado Interstate's Lakin-Denver line, east of Denver, 95 miles north to Cheyenne, Wyo. A 3-mile lateral serves Brighton and Fort Lupton, Colo.; 4 miles of 8-in. lateral loops line to Boulder, Colo., from old main line. Former completed in 1948; latter in service last January. Cost, $1.5 million.

5. EAST OHIO GAS CO. An $11.4-million line completed in October, 1948, about 75 miles long; from Inch lines at Mullett Farm station, near West Virginia line, to Robinson station, near Canton, Ohio.

East Tennessee

6. EAST TENNESSEE NATURAL GAS CO., Nashville. Line approved in January, 1948, to cost $11.5 million, has not been started—construction due to begin in the fall, completion about 10 months later. From Chattanooga, Tenn., to Knoxville.

7. DELAWARE POWER & LIGHT CO., Wilmington. Construction of $590,000 line approved in 1948 may not start until next year. Running from the Pennsylvania - Delaware state line south of Chester to Wilmington, the 12-in. line will carry mixed gas bought from Philadelphia Electric Co.

8. HOPE NATURAL GAS CO., Clarksburg, W. Va. Line approved in April 1948, between Cornwell station and Hastings station. A 26-mile line, it will increase Hope's take from the Tennessee Gas line by 200 MMcf. Estimated cost, $1.8 million.

9. IROQUOIS GAS CORP., Buffalo, N. Y. Line approved last October for 13 miles of loop line in the Buffalo area. Cost, $1.36 million.

10. KANSAS-COLORADO UTILITIES INC., Lamar, Colo. line, part of $500,000 facilities runs 8 miles from Wiley to McClave, Colo.

11. KANSAS-NEBRASKA NATURAL GAS CO. INC., Hastings, Neb. Approved in June of 1948; part of one of the lines only has been completed—33½ miles of a 62-mile loop from Scott City (Kan.) compressor station northeast. Three other lines also approved, not yet completed, consist of 40-, 15- and 5-mile lengths, and will serve Mason City and several other towns in Loup river area. Cost, $5.3 million.

12. KENTUCKY-WEST VIRGINIA GAS CO., Ashland, Ky. Approved in November, 1948, completed in December; three miles long.

13. KNIGHTSTOWN (IND.) NATURAL GAS CO. Five-mile line, costing $30,000. Approved Aug. 3, 1948, not yet under construction.

14. CUMBERLAND & ALLEGHENY GAS CO., Pittsburgh. Approved in January, 1948, to be constructed for $130,000; between Terra Alta, W. Va., and Oakland, Md.

15. HOME GAS CO., Binghamton, N. Y. Line approved in January, 1948; 26 miles between Hancock and Coshecton, N. Y., and 25 miles from Dundee storage field to Horseheads, N. Y. Cost, $1.2 million.

16. MICHIGAN GAS STORAGE CO., Jackson. Portions of line approved in 1946 will be completed next month. Sixty-one miles at southern portion is about finished; also due for completion next month is a 14-mile spur from the line to run west to Lansing. Cost, $21.3 million.

17. MICHIGAN-WISCONSIN PIPE LINE CO., Detroit. Approved in late 1946; $88-million line will connect Austin storage field, Mich., and cities in Wisconsin and Michigan, as well as towns along the way, with Hugoton field. Started in December, 1947; about half completed—455 miles to Marysville, Mo., by last January. Completion date is May, 1950.

18. MISSISSIPPI RIVER FUEL CORP., St. Louis. Approved in August, 1946. Will cost $14.4 million and will carry gas from Monroe field, La., to St. Louis and St. Louis county, now planning changeover.

19. NATURAL GAS PIPELINE CO. OF AMERICA, Texoma Natural Gas Co., Chicago. Approved January, 1947, $20-million line, completed last October, looped existing Panhandle-Joliet (Ill.) line, tied in Hugoton field.

20. NEW YORK STATE NATURAL GAS CORP., Pittsburgh. Construction includes 9 miles from State Line station to Sharon storage field, laid in 1948; 12 miles in Potter county, Pa., scheduled to start last March; 20 miles in McKean county, Pa., started same time.

21. NORTHERN NATURAL GAS CO., Omaha. Four separate loops, laterals, and extensions of Panhandle-St. Paul line built last year: 11 miles of loop north of Clifton station, Kan.; 18 miles of line to Dodge City, Kan.; 19 miles of Garden City (Kan.) lateral; 85 miles of pipe in producing fields.

22. REYNOSA PIPE LINE CO. Line approved in late 1946 not complete. Cost, $637,000. Runs from La Blanca field, Texas, to Mexican border for export.

23. SOUTHERN COUNTIES GAS CO. AND SOUTHERN CALIFORNIA GAS CO., Los Angeles. Construction completed last year, under way, and to be started later consists of loops and laterals along Texas-California line. An 8-mile line to Pasadena between Rivera and Garvey, Calif., was completed Nov. 30, 1948. An 88-mile loop is to extend from near Garnet westward to a junction with Pasadena lateral near Montebello. A 6.5-mile section was scheduled to start last month. Remainder will be completed in 1950 or later. Line from Rivera to Crenshaw Blvd. in Los Angeles, 15 miles, is to get under way this summer. A 2-mile section from Texas line to Southern Counties' system at Coyote Hills in Orange county was completed last November. Southern California completed 73 miles from Texas pipeline near Desert Center to Calexico in Imperial valley.

24. TEXAS EASTERN TRANSMISSION CORP., Shreveport. Line approved in May 1948 completed; includes laterals from Big Inch to Philadelphia.

United Gas

25. UNITED GAS PIPE LINE CO., Shreveport. Construction totaling $4.5 million approved in various dockets in 1947 and 1948. Completed last year: 6 miles from Sterlington to Perryville, La., and 9 miles from Lone Star's Carthage, Texas, gasoline plant to Carthage-Longview line. Scheduled for completion in 1950 are: 93 miles from Baxterville field, Miss., to Mobile Junction, Ala.; 13 miles at Pensacola, Fla. Completion of an additional total of 83 miles in north Mississippi still indefinite.

26. POTOMAC GAS CO., Washington, D.C. Line approved in mid-1948: 18 miles from connection with Virginia Gas Transmission Corp. near Dranesville, Va., to Arlington, Va., to connect with Washington Gas Light Co. and its subsidiaries. Cost, $1.2 million.

27. TRANS-CONTINENTAL GAS PIPE LINE CO. INC., Longview, Texas. Line approved in May 1948: 1840 miles from Gulf Coast area of Texas and Louisiana to New York City. Work now under way. Cost, $200 million.

28. SOUTHERN NATURAL GAS CO., Birmingham, Ala. Lines approved in 1948. Construction last year: 33 miles to loop branch line to Gadsden, Ala., with extensions to Lexington, Miss., and White Plains, Ala. Includes 6½ miles of loops, a four-line crossing of Tallapoosa river, 5 miles of branch looping in Gwinville field.

29. UNITED FUEL GAS CO., Charleston, W. Va. Approved in 1947, 70 miles in West Virginia in Roane, Calhoun, Gilmer, Doddridge, and Wetzel counties. Part of single 115-mile system from Cobb station, Roane

(Continued on page 96)

Key To The Map

(Continued from page 95)

county, to Monongahela county, W. Va., to connect with Manufacturers Light & Heat Co. line. Cost, $3 million.

30. ARKANSAS-OKLAHOMA GAS CO., Fort Smith, Ark. Line approved in 1947: 7 miles of loop from Spiro field, La Flore county, Okla., to town of Spiro. Cost, $130,000.

31. PENNSYLVANIA GAS CO., Warren, Pa. Line approved in June 1948 included 8½ miles extending south from end of company's line in Elk county, Pa., connecting with New York State Natural line. Cost, $160,000.

32. OHIO FUEL GAS CO., Columbus. Lines approved from May 1947 to August 1948 included 90 miles of line in Ohio from near Burlington to Crawford station, replacing existing line; 22 miles from Brown station to Monroe and thence to Pavonia station; 97 miles from Treet station, Licking county, to connection with West Ohio Gas Co. in Allen county and laterals to Marion and three other towns; 61 miles bewteen Pavonia station and Toledo, 8 miles from Texas Eastern's station in Warren county, Ohio, to connection with Ohio Fuel Gas Co.'s line at Centerville station in Montgomery county, Ohio.

33. WEST TEXAS GAS CO., Lubbock. Line approved last October: 15 miles to replace a line between Littlefield and Sudan, Texas. Estimated cost, $335,000.

Colorado Interstate

34. COLORADO INTERSTATE GAS CO., Colorado Springs. Line approved in August 1948: 6 miles of loop lateral from main Panhandle-to-Denver line near Colorado Springs. Second line approved in October 1948; 6 miles from Lakin-Denver line to Hugo; 5 miles of line from the Lakin-Denver line in Elbert county to Limon. Cost, $155,000.

35. LONE STAR GAS CO., Dallas. Line approved September 1948; 39 miles from Crush Junction, Hopkins county, north to second line west of Paris. Cost, $600,000.

36. ARKANSAS-LOUISIANA GAS CO., Shreveport. Lines approved last December, 4 miles to replace existing line, 1 mile of line crossing Arkansas river at Little Rock. Cost, $150,000.

37. EL PASO NATURAL GAS CO., Houston. One line approved in December 1947: 83 miles of line from Texas-California line to Tucson, Ariz., to cost $3.3 million. Second approval last September: 450 miles of loop paralleling Texas-California line from Lea county, N. Mex., to Colorado river. Cost, $56 million.

38. MANUFACTURERS LIGHT & HEAT CO., Pittsburgh, Pa. Approved in June 1947, 130 miles of line from a junction of the main line of Manufacturers at Coatesville, Pa., to Home Gas Co.'s line near Port Jervis, N. Y. Cost, $5.2 million.

39. TENNESSEE GAS TRANSMISSION CO., Houston. Lines approved last year included 150 miles of loop on main pipeline. Cost, $12 million (see Line 8). Second line included substitution of 207 miles of 30- and 31-in. line for 26-in. line previously authorized. Additional cost was to be $4 million.

40. PANHANDLE EASTERN PIPE LINE CO., Kansas City, Mo. Line approved in June 1948, 356 miles of looping the main transmission line. Cost, $27 million.

Arrows indicate new source of supply and 40-mile line which together helped Lone Star Gas Co. establish a new peak sendout record of 716 MMcf.

Speedy Construction Averts Peak Shortage

This section map indicates location of Lone Star Gas Co.'s 40-mile transmission line, connecting new supplies of gas in Winnsboro and Coke fields with the northeastern section of the pipeline system, which contributed materially to the meeting of a record peak demand during the current heating season. The company hit an all-time peak of 716,000 Mcf of gas on Jan. 30.

The new line, completed earlier in the winter, tied in two dead-end sections of the company's transmission system with a third line serving a major distribution area in northeast Texas. The 20 MMcf of gas supplied through the new line strengthened this former critical area of the system; and, through a junction point at Enloe, at one of the former dead-end lines, gas was also routed west to strengthen centrally located sections of the system. During the winter heating season gas was routed either north or west and on some occasions both ways.

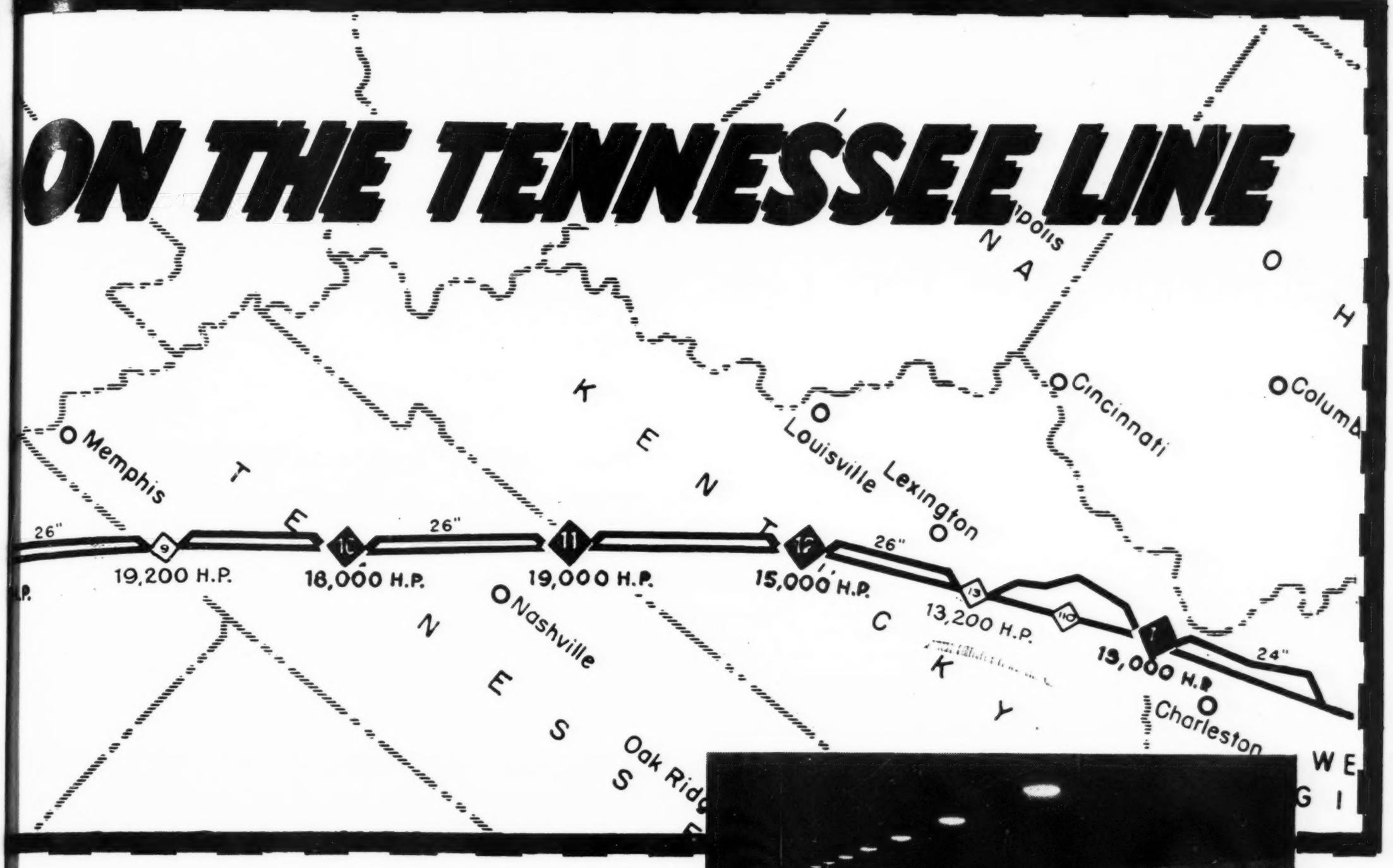
The line extends from Winnsboro and Coke fields south of Sulphur Springs, Texas, north to a point near Paris where it connects with a major east-west transmission line operated by the company. Gathering lines connected the line with nine wells in the two adjacent fields where a new dehydration plant has also been constructed to serve this line.

Built in a record 30 days, the line is of welded construction and, although originally designed as a 10-in. line, was completed with a combination of 8-, 10- and 12-in. pipe. Due to scarcity of materials, 22 miles of 10-in. pipe were used, followed by 10 miles of 12-in. and eight miles of 8-in.

Contractor on the job was Latex Construction Co. of Houston which employed an average of 135 men on the project. Despite rocky terrain and the crossing of highways, railroads and farm-to-market roads and two rivers, good weather conditions and the steady flow of available materials made possible the better than one-mile-a-day construction record.

Field gathering lines were constructed by Lone Star Gas Co. pipeline crews. The nine wells in the two fields are feeding the new line from Bacon and Gloyd limes.

ON THE TENNESSEE LINE



THE story of the Tennessee Gas Transmission Company's big line is one of continuous growth from its beginning in 1944. Present capacity is 600 million cubic feet of gas a day. This year further expansion will add another 60 million cubic feet daily.

The line's engine-driven compressors now total 215,400 hp. Well over half, 119,000 hp, is furnished by Cooper-Bessemer units. Of these, 87 are modern 1000 hp V-angles . . . GMV'S. Still more GMV's are to be added during the year.

On this and other lines GMV performance has proved a point of major importance to compressor users . . . that despite money-saving compactness, GMV's are truly rugged units,

• Note the typical compactness of this 7,000 hp group of GMV's on the Tennessee Line. A GMV from the compressor cylinder side is shown on the opposite page.

with exceptional resistance to wear and freedom from trouble. It adds up to compressor service at the lowest of low cost.

You'll be money ahead if *your* plans call for Cooper-Bessemer V-angles. They are built in three types from 200 to 2400 bhp.

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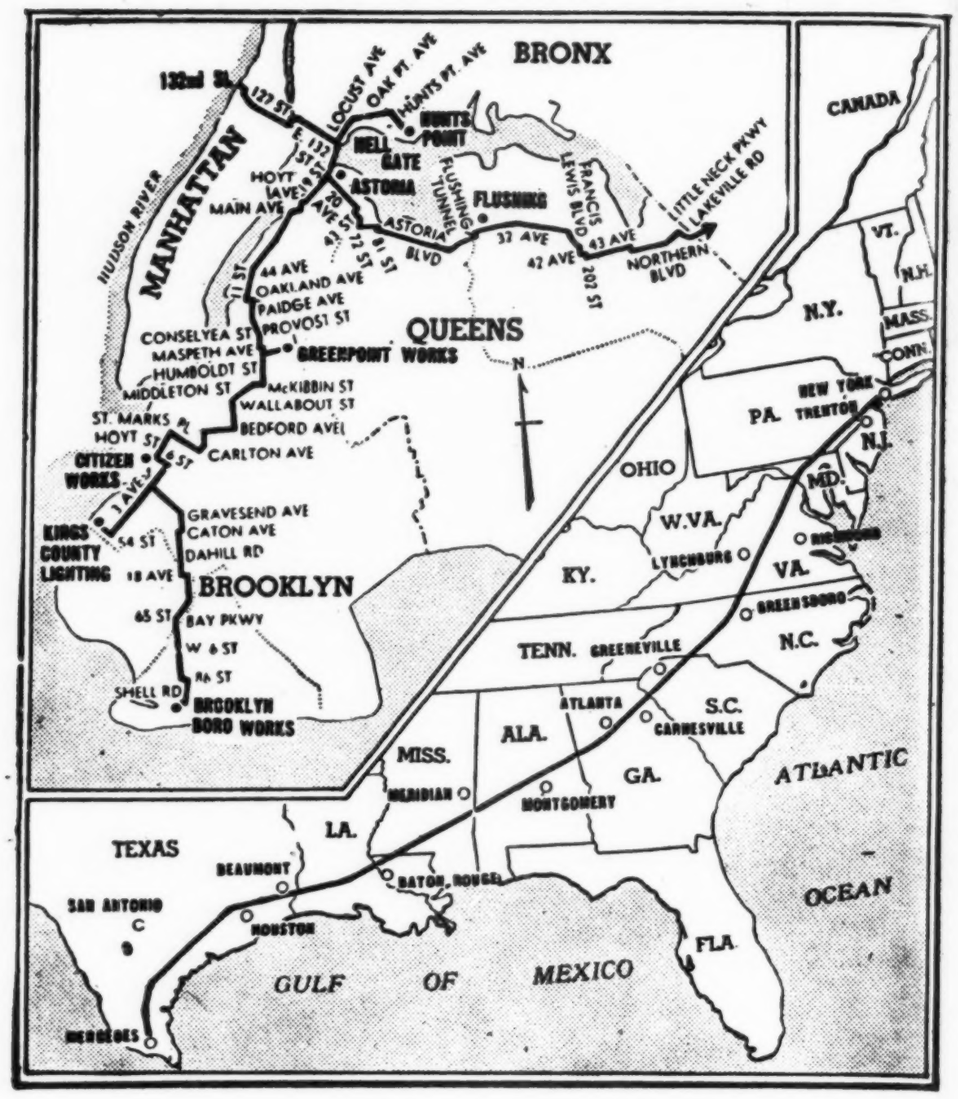
Work Begins This Month on $200 Million New York Line



Maps show 1840-mile line and detail of take-off lines in New York City area.

CONSTRUCTION is scheduled to start this month on the Trans-Continental line, spanning 12 states in its 1840-mile route from McAllen, Texas, to 132nd St. in New York City, which will deliver sorely-needed fuel gas to the New York-New Jersey-Pennsylvania industrial area at the rate of 340 MMcf per day.

Work will begin in mid-May from Eunice, La., moving eastward and northward to the vicinity of Atlanta this year, a distance of some 600 miles. The remaining part of the line will be completed in 1951 and delivery will begin in uptown New York in November of that year.

The line will be built by the Fish Construction Co., Houston, for the Trans-Continental Gas Pipe Line Co., also of Houston. Estimated cost of the project is approximately $190 million with the main trunk or carrier line to be of 30-in. pipe, the largest ever used for such a distance.

Eight Distributors

Eight major gas distributing companies in the New York area will get the gas for industrial and residential use, under allocations made by the Federal Power Commission in granting the company permission to build the line. They are:

Consolidated Edison Co., of New York; the Brooklyn Union Gas Co., and the Brooklyn Borough Gas Co., the Public Service Electric & Gas Co., of New Jersey; Philadelphia Electric Co., Long Island Lighting Co., Kings County Lighting Co., New York, and Elizabethtown Consolidated, Elizabeth, N. J.

The company was formed in 1946, to bid on the Big Inch and Little Inch lines built as war oil emergency carriers. Each is shorter than Trans-Continental's presently planned line.

Mr. Williams and his associates bid $131 million for the lines, losing out to Texas Eastern Transmission Co. But, before they bid, they had filed an application with the Federal Power Commission for a brand-new line, pressing that application when their bids failed.

Anniversary

Almost a year to the day after the Federal Power Commission approved the line on May 29, 1948, actual construction will be started. The intervening months have been spent in engineering work, surveying, planning, and arranging for materials.

The contract for complete engineering, construction and general supervision of the line, given to Fish Constructors Inc., is the largest single contract ever awarded in the American gas industry. Thousands of men will be used in the field and Trans-Continental plans to employ approximately 1000 in its own organization working out of Houston headquarters.

Gas fields, largely in Texas and Louisiana, bisected by the line contain an estimated 90 trillion cu ft of gas reserves. Trans-Continental has some 3 trillion ft already under contract and reports "adequate reserves available all along the line."

Pipe Facts

The line will contain 71 miles of 20-in. pipe, 559 miles of 26-in., and 1210 miles of 30-in. To provide ultimate capacity, 20 compressor stations totaling 220,000 hp will boost the gas along the line, with plans for seven of 72,000 hp to be completed in the initial program.

To cross the Mississippi, about 50 miles north of Baton Rouge, three 20-in. pipes will be sunk at bottom level. Gas from the main trunk on the west side will be divided into three pipes, then collected again into a single pipe on the eastern side.

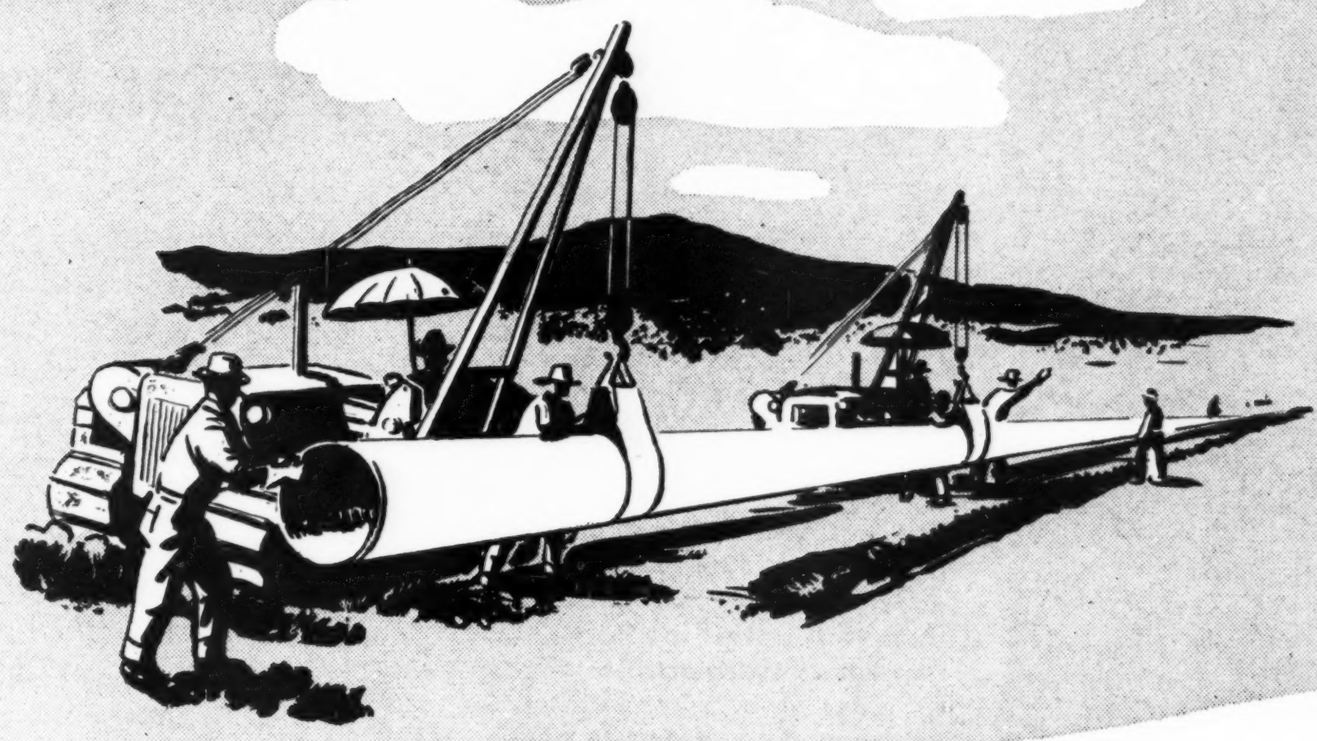
Louisiana's other major river, the Atchafalaya, will be bridged for 4000 ft, carrying the pipe above the water. A similar bridging operation is scheduled for the Coosa in Alabama. Other rivers will be crossed like the Mississippi.

Route

When completed, the line will run from McAllen, which is 15 miles north of the Rio Grande, north and east through Texas, via the cities of Alice, Victoria, Houston and Beaumont; enter Louisiana near Lake Charles, and skirt Montgomery, Ala., and Atlanta, Ga., turning northerly by Athens, Ga.; Spartanburg, S. C.; Winston-Salem, N. C., west and north of Washington, D. C., north of Baltimore, and then by Philadelphia and Linden through Elizabeth and Newark, N. J., into New York City proper.

As industrial demands grow in the New York area to be served, plans call for ultimate expansion to 500 MMcf daily capacity, possibly more in the future as conditions warrant.

For further details on this job, see GAS, *May, 1948, p. 50, and Jan., 1949, p. 48.*



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Shallow Water Repairs Made by Regular Crews

By KARL WOODARD

Safety Director
Houston Pipe Line Co.

The equipment at left is used by Houston Pipe Line Co. to effect underwater repairs less than 15 ft below the surface of the water. It also enables crews to clear debris from around submerged lines and to check lines for swing.

UNDER-WATER pipeline repairs are being handled by Houston Pipe Line Co. with "Scott-Air-Pak," special equipment which makes it possible to clean, check or repair submerged lines in shallow water without hiring divers or using other expensive methods. This equipment consists of a rubber face piece similar to that used on gas masks, an inhalation and exhalation hose, a demand regulator which was developed by the Scott Aviation Corp. during World War II for high altitude flying, two 25-ft lengths of 6000-lb test hose, and one 230-cu ft cylinder of certified pure air at 2300-lb pressure. The cylinder is equipped with a pressure gauge and regulator and contains enough air for 40 minutes work under water.

Exclusive

Various uses have been found for the equipment in gas pipeline operations—among them, clearing debris from around submerged lines, checking the line on river beds for swing, and repairing of under-water leaks.

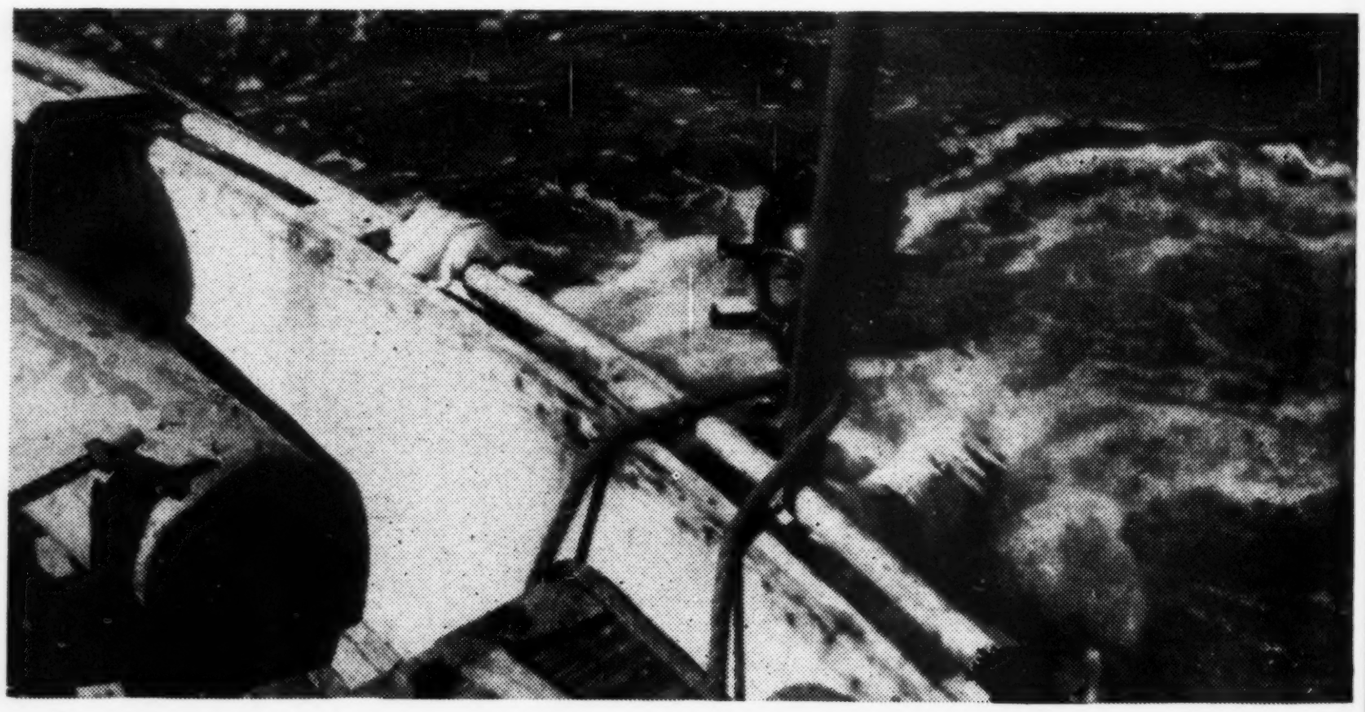
Previously it was customary when the leak was close to the bank or in a shallow stream to build a cofferdam, pump out the water and proceed with the repairs. This required a number of men and considerable time was involved. Should the leak be in a location where it was not possible or practical to build a cofferdam, one or two men were sent under water with the button, clamp and working tools. This required considerable time and many trips below, as the men could remain submerged only as long as they could hold their breath.

With this new equipment all leaks within 50 ft of the bank can be repaired by leaving the cylinder on the bank and walking in to the leak. On leaks beyond 50 ft it is necessary to use a boat and one 25-ft section of hose. The cylinder is kept in the boat while the repairman works below. A joint of 1-in. pipe is stuck in the river bed along the line and near the leak. This pipe serves as an anchorage for the boat and a marker for the diver so that no time is lost under water trying to find the leak.

Six leaks have been repaired on 6-in. and 8-in. lines. The greatest depth worked at was 13 ft and the longest time required under water on any one leak was 11 minutes.

All men in all crews are trained in the use of this equipment, but only volunteers are used to do the work.

Certain safety precautions have been set up. On the surface one man attends the air supply, watching the pressure gauge and regulator gauge. One man attends the air line and life line. No one is permitted to remain submerged longer than 15 minutes at a time, neither is he permitted to go below 15 ft. Proper clothing must be worn to avoid barnacle cuts. Prearranged signals are given by tugging the life line either by the diver or the attendant.



When spot to be repaired is more than 50 ft from bank repairman uses 25-ft section of hose and works from boat. Upper picture shows diver descending to check cause of roily water; at bottom, with leak fixed, water is calm.

CORROSION DAMAGE PREVENTION...

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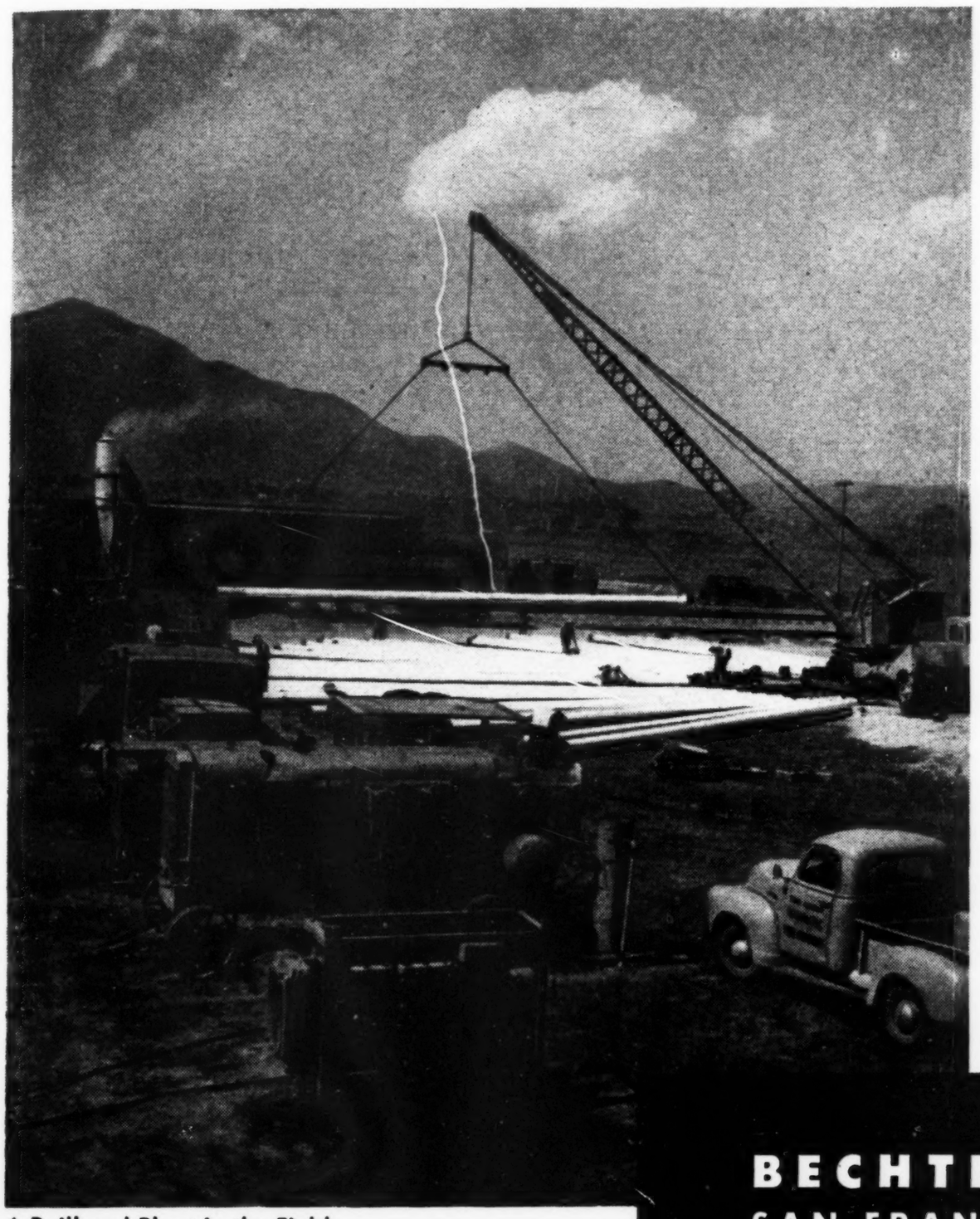

A Railhead Plant in the Field

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Relation of Gas Hydrates To Pipeline Operation

By W. M. DEATON and E. M. FROST JR.*

This paper presents the results of work done by the Petroleum and Natural Gas Division, Bureau of Mines, U. S. Department of the Interior, in cooperation with the Natural Gas Department of the American Gas Assn. A brief history of gas hydrates is included, and several methods that may be used when hydrate freeze-ups occur in a pipeline are discussed.

During the study of gas hydrates, the authors found a need for a means to determine the water dew point of natural gases. As no adequate apparatus was available, one was developed. A description of the dew point apparatus is included in the appendix.

Copies of the complete report, designated as Monograph 8, may be obtained from the American Gas Assn.

A survey of the early literature reveals that gas hydrates were discovered by Sir Humphrey Davy as long ago as 1810 and that various investigators in England and Europe had experimented with them during the period 1882 to 1902 and again from 1919 to 1927. The first report on gas hydrates published in the United States, however, was the experimental work of Hammerschmidt[1] in 1934; he was concerned with the freezing conditions occurring at temperatures considerably above 32°F in a plant built to remove excess water from natural gas.

The early work by Hammerschmidt focused the attention of the natural gas industry on the subject; in 1935, the Bureau of Mines entered into a cooperative agreement with the Natural Gas Department of the American Gas Assn. for a comprehensive study of gas hydrates and their relation to the operation of natural gas pipelines. In carrying out its assignment, the Bureau of Mines made a field study to obtain information from natural gas producers and pipeline operators.

Reports from pipeline operators confirm the experience of the authors, who have found that freezes commonly occur in a pipeline on a rising slope where the line rises out of a sag or low point. In explanation, it would appear that the percolating action of the gas as it surges past water lying at low points in the line favors the formation of hydrates. The forward motion imparted by the flowing gas tends to carry the hydrates and the water up the rising slope, where ultimately hydrates are deposited to form a constriction in the line. Such an obstruction then may grow to a complete stoppage, aided by the collection of loosened hydrates moving forward with the gas and by even more favorable hydrate-forming conditions because of a lower temperature produced by throttling of the gas through the partial plug.

Another location where experience teaches that freezes caused by hydrates may be expected is at the junction of one pipeline with another, such as where a field line enters a main line. The reason for this is not definitely known; but, in some cases, it may be that the field gas sidestream carries some water, and mixing of the two gas streams results in turbulence which aids in the formation of hydrates.

Experimental laboratory tests on the formation of hydrates were made by the Bureau of Mines. The experimental aparatus, the test methods, and the data obtained are discussed in this report. Data obtained on the hydrate equilibrium temperatures and pressures for natural gases, pure gases, and synthetic mixtures of gases are presented in both tabular and graphic form. They show that there is considerable variation in the equilibrium hydrate-forming temperatures and pressures for various natural gases. Measurements made of the gas:water ratio in the hydrate molecule both by direct measurement and by thermodynamical analysis also are included.

The data indicate that the methane hydrate molecule contains seven molecules of water for each molecule of methane, giving a chemical formula of $CH_4 \cdot 7H_2O$, that ethane hydrate may be represented by the formula $C_2H_6 \cdot 8H_2O$, propane hydrate by $C_3H_8 \cdot 18H_2O$, carbon dioxide hydrate by $CO_2 \cdot 7H_2O$, and a natural gas hydrate approximately by a formula of $X \cdot 9H_2O$.

Inhibitors sometimes are useful in removing or preventing the formation of hydrates in pipelines or gas treating equipment. Data on the effectiveness of various inhibitors in preventing hydrate formation were reported by several investigators[2-3-4] while the general investigation of gas hydrates was being conducted by the Bureau of Mines. As these data seemed adequate, the authors did not extend them, except by making field tests to determine the practicability of using inhibitors in gas pipelines. The field tests showed that the use of inhibitors was more suited to relieving plugging caused by hydrates than to the prevention of the formation of hydrates in gas pipelines. The work of other investigators on the effect of various inhibitors on the formation of hydrates is discussed, and a summary of some of their experimental data is included in this report.

The temperature of the gas in a pipeline must be known to permit judging whether there is danger of hydrate formation in the line. Consequently, in order to estimate with some degree of certainty the temperature of underground pipelines, an extensive temperature survey was made. The results show that the temperature of the gas in a gas transmission line conforms closely to the temperature of the line and this, in turn, to the temperature of the ground at pipeline depth. Continuous temperature records over more than three years at several locations along natural gas transmission lines and at special temperature measurement stations at Amarillo, Texas, and Laramie, Wyo., show that the underground temperatures at usual pipeline depths remain relatively constant, changing only slowly with the season of the year and being affected very little by short periods of abnormal temperatures.

When hydrate freeze-ups occur in a pipeline, remedial measures that may be applied in the field to combat them are of interest. Injection of alcohol (usually methanol) or other antifreeze type chemicals into the pipeline has been found satisfactory in some situations. Ammonia (NH_3) injected into the gas stream either as vapor or liquid has been found effective in removing hydrate plugs. It has been used to prevent the formation of hydrates,[2] but, as it reacts with carbon dioxide in the presence of water to form ammonium carbonate or bicarbonate and most natural gases contain small amounts of carbon dioxide, the ammonia is gradually used up, and its continuous injection into the gas stream to keep hydrates from forming is not popular.

A reduction of the line pressure be-

*Mr. Deaton and Mr. Frost are, respectively, helium engineer and chemical engineer at the Bureau of Mines helium plant at Amarillo, Texas.

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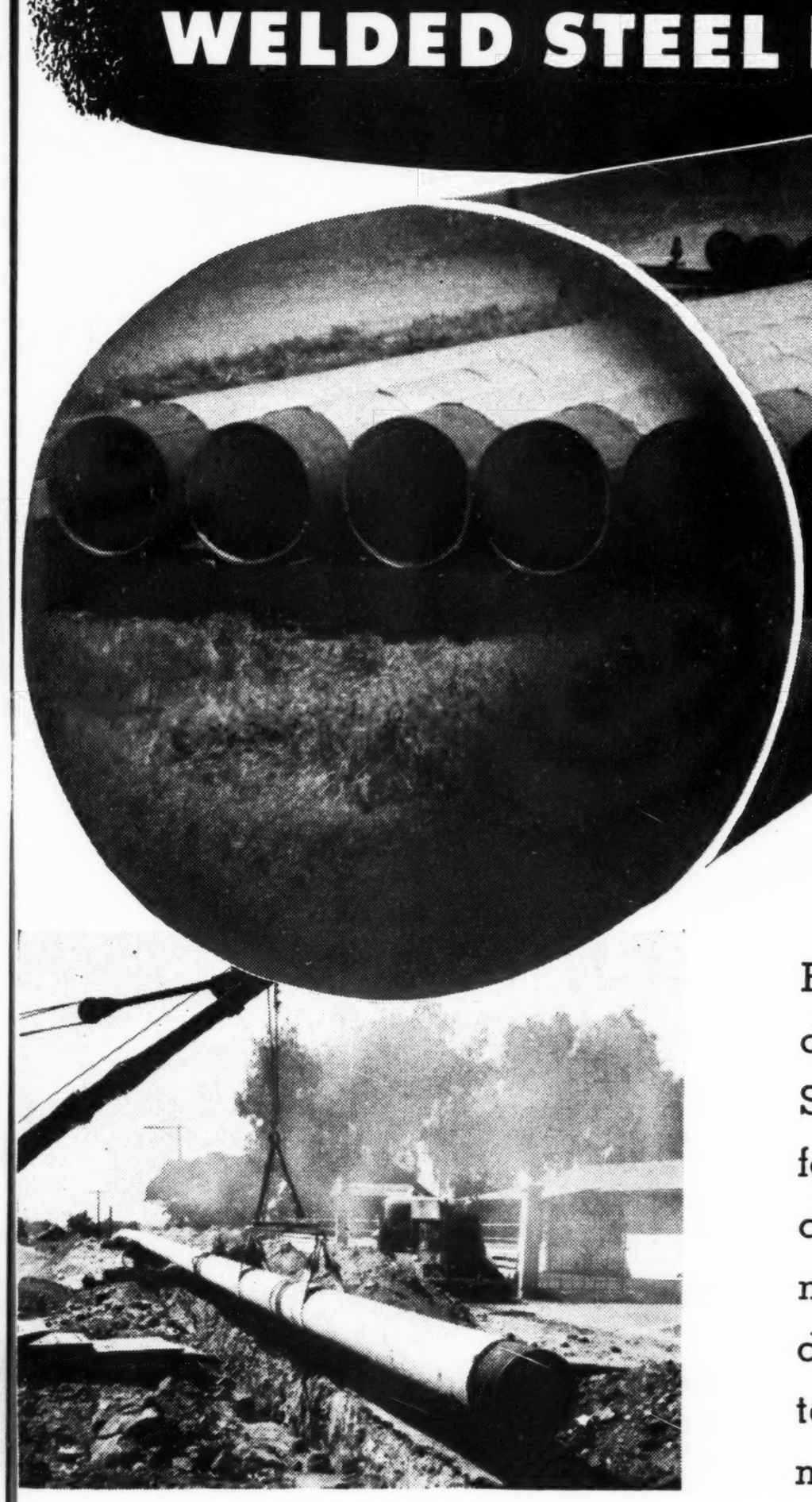

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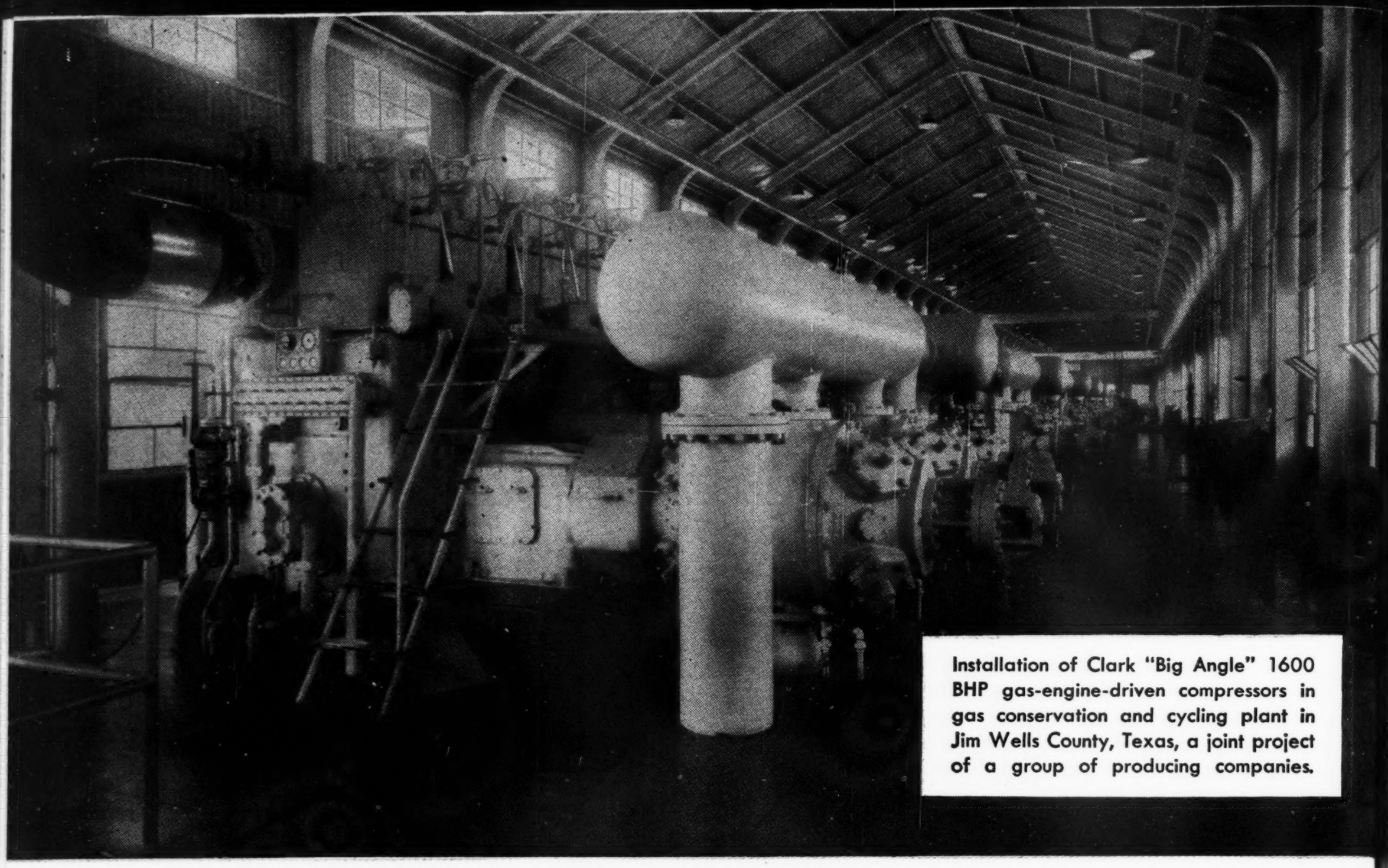


Installation of Clark "Big Angle" 1600 BHP gas-engine-driven compressors in gas conservation and cycling plant in Jim Wells County, Texas, a joint project of a group of producing companies.

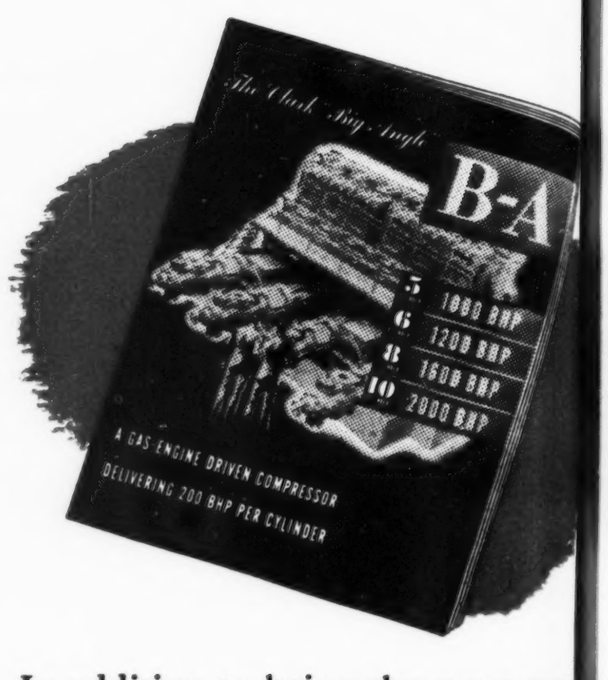
CLARK "BIG ANGLES" Conserve Gas in Joint Project near Premont, Texas

An outstanding example of joint operation of a gas conservation program is this plant on the Seeligson Ranch in Jim Wells County, Texas. Co-operating in this project are the following companies: Magnolia Petroleum, Ramsey Petroleum, Phillips Drilling, Renwar Oil, Republic Natural Gas, Shell Oil, Sinclair-Prairie Oil, Sun Oil, Sunray Oil and Texas Gulf Producing Company.

This fine, modern plant is equipped with eight Clark "Big Angle" 8 cylinder, 1600 BHP Compressors, with more units to be added. Residue gas is derived after extraction of natural gasoline and other products from casinghead gas produced with oil. The flare gas thus conserved is compressed in three stages up to 1000 psi and discharged into a pipe line for transmission.

Part of the ultimate plant will also be devoted to the manufacture of natural gasoline and allied products from high pressure gas, and the return of cycled gas to the sands at about 3000 psi.

This large scale conservation and cycling project shows what can be accomplished by a unitization plan through co-operation of the various companies who have an interest in a given field.



In addition to being the most compact heavy-duty gas-engine-driven compressor unit, the Clark "Big Angle" is also the most accessible. Saves money in installation costs and maintenance. For complete description, dimensional drawings and other useful data, send for Bulletin B-A.

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low the equilibrium hydrate-formation pressure for the existing pipeline temperature is the surest way of breaking up any line plugs caused by hydrates. The water resulting from decomposition of the hydrates should be removed as soon and as completely as possible to prevent its being reconverted into hydrates when full operating pressure is restored to the line.

The only sure preventive measure found by the authors is to dehydrate the gas. Various methods of dehydrating gases are discussed, and references are given for those interested in various specific methods. The two methods most commonly used are these:

1. Contact the gas with a hygroscopic solution in some type of absorption tower, whereby the water vapor content and the water dew point temperature of the gas are reduced to a value low enough to prevent condensation of water at any point in the gas transmission line.
2. Pass the gas through a bed of water-adsorptive material, such as silica gel, activated alumina, or activated bauxite, whereby the water vapor content is reduced to a value that precludes condensation of water in the pipeline.

The water vapor content of compressed gases obviously is of interest to the gas engineer in the operation of natural gas pipelines and in the control of dehydration plants. Experimental data on the subject were collected by the authors as a part of the gas hydrate study. These data are presented, and a comparison is made of the work of other investigators. The data show that compressed natural gases, along with other compressed gases, contain a greater quantity of water when saturated than would be calculated from the water vapor pressure data available in handbooks and steam tables if the usual gas-law relationships are applied. The extent of this deviation, and a chart showing the water vapor content of a typical natural gas, will be found in the appendix of this report.

[1]Hammerschmidt, E. G. Formation of Gas Hydrates in Natural Gas Transmission Lines. *Ind. Eng. Chem.*, vol. 26, 1934, pp 851-855.

[2]Russell, J. T. The Use of Anhydrous Ammonia to Inhibit Gas Hydrate Formation. *Proc.*, Am. Gas Assn., 1937; *GAS*, vol. 13, No. 6, 1937, pp 38-40; *Amer. Gas Jour.*, vol. 146, No. 6, 1937, pp 22-26-32.

[3]Hammerschmidt, E. G. Preventing and Removing Hydrates in Natural Gas Pipelines. *GAS*, vol. 15, No. 5, pp 30-34, 94; *Gas Age*, vol. 83, No. 9, April 27, 1939, pp 45-49, 63; *Oil and Gas Jour.*, vol. 37, No. 52, 1939, pp 66, 69, 71, 72.

[4]Powell, J. S., Jr. Lowering of the Decomposition Temperature of Natural Gas Hydrates. *Proc.*, California Nat. Gasoline Assn., Sept. meeting, 1939, pp 7-13.

Stanolind Plant Produces Inert Injection Gas, Sulphur

PRIMARILY a gasoline plant, the new Elk Basin (Wyo.) installation of Stanolind Oil & Gas Co., Tulsa, Okla., will also produce sulphur and will generate inert gas for injection into the Elk basin field, according to E. F. Bullard, president of Stanolind.

The plant, scheduled to be completed last month, will produce 17,000 gal of gasoline and 39,000 gal of butane and propane daily. It will have a capacity of 12 MMcf of feed gas each day.

Gas from the Elk Basin field is about 20% hydrogen sulphide. This will be extracted in the plant from the gas and processed to recover the sulphur. More than 70 long tons of sulphur will be produced daily.

The gas injection program is designed to prolong the life of the Elk Basin field, the largest and most productive in Wyoming. The gas injection is also expected to increase the amount of oil recovered. Ordinarily the gas produced with the oil from a field is repressured and injected back into the producing horizons. However, not enough gas is produced from the Elk Basin field to carry out the injection program, so more must be made. This is done by burning natural gas with air. About ten times as much gas results from this process. The gas is then compressed to very high pressures for injection.

Stanolind is building the plant and will operate it for members of the Elk Basin unit. Major unit members are Stanolind, Continental Oil Co., Carter Oil Co., Ohio Oil Co., Mackinnie Oil Co., and Drilling Co. Three hundred fifty men rushed construction work at the site, 17 miles north of Powell, in Park county, Wyoming.

Crane raises 12-ton deethanizer tower into position at Elk Basin (Wyo.) plant.

San Diego Bolsters System For Winter With Texas Gas

By JAMES JOSEPH

SAN Diego county, faced with a January gas emergency which threatened to cut off its full fuel supply, will soon have a new, 85-mile long, 16-in. pipeline and a one million-gal propane-air storage system, as San Diego Gas & Electric Co.'s construction projects get under way.

Exclusive

The 16-in. natural gas transmission line, which will connect to Southern Counties-Southern California Gas Co.'s 30-in. interstate line bringing natural gas from the Permian basin, is awaiting final FPC approval. Company officials believe the government's okay, in view of a near disastrous January and February, will be forthcoming soon.

And LP-Gas

The $1.5 million LP-Gas plant, capable of delivering 70 MMcf per day for short emergencies, will take the place of manufacturing equipment which has acted as the company's standby plant.

The San Diego county extension was approved by the California Public Utilities Commission in November. At that time the company proved that increasing demands from both residential and firm customers could not be met by its single 12¾-in. line which brings gas from wells lying to the north. This line supplies but 33 MMcf per day, and has been San Diego Gas & Electric's sole natural gas supply since 1932.

The new 16-in. line—which will be known as the Moreno line—will be a joint investment of Southern Counties-Southern California Gas Co.'s and the San Diego concern. It will move approximately 40 MMcf per day upon completion sometime the latter part of this year.

In a 10-year contract, signed in October, 1948, the Los Angeles companies agreed to finance, build, and operate 35 miles of the line across Riverside county from its connection on the existing interstate transmission line to the San Diego county line, near Rainbow. San Diego Gas & Electric will operate and build the remaining 50 miles of line.

Sheffield Steel Corp., a Texas concern, will produce steel which El Paso Natural Gas Co. has released to San Diego. Skelp will then be shipped to Milwaukee where the A. O. Smith Corp. will fabricate. It is estimated that 11,000 tons of plate will fabricate into approximately the required 85 miles of 16-in. pipe.

Completion of pipe fabrication is expected sometime in late September. Yield is to be 52,000 lb minimum with test pressure 90% of yield strength or 1463 psi. Actual beginning of pipeline construction is not expected to commence until late July.

Southern companies' 35-mile section will cost approximately $1,931,700 to construct. San Diego Gas & Electric Co.'s 50-mile section will call for a fixed capital outlay of $3,037,500.

In presenting its case before the California Public Utilities Commission, San Diego Gas & Electric showed a 1948 peak day requirement of 51.4 MMcf with estimated peak to reach 69.7 MMcf by 1952. Interruptibles had been without gas since mid-November; only in late March was service restored as loads decreased.

Service complaints reached 2857—highest in the company's history—in a three-day cold snap during the January-February gas emergency. For one two-day period of peak load—February 12-14—complaints increased 370% over the 1947 level. And this was but one of several emergency peaks during the first two months of 1949.

San Diego Gas & Electric increased its total customers, both residential and commercial, by 7810 during 1948, with an estimated increase of 37,000 by 1953.

The total 70 MMcf per day delivery, when the new line is completed, will give San Diego a safe peak load margin into the foreseeable future—estimated to 1953. Estimated peak day load—January and February—for 1953 will reach 69.7 MMcf per day. Present facilities—both the existing line and the old manufacturing plant—can deliver but 51 MMcf per day maximum.

In addition to fixed monthly charges for gas delivered to San Diego, commodity charges per 1000 cu ft of natural gas will be 21.6 cents. For gas used by San Diego as boiler fuel in the operation of its own steam electric and gas generation stations, the commodity charge will be 15 cents minimum per Mcf; base price, 24 cents; maximum charge: 30 cents.

Three plans and their relative costs for standby gas were presented by San Diego Gas & Electric Co. One plan called for a new standby plant, no change in pipeline capacity. Estimated annual cost of standby gas for 1951 under this condition would be approximately $2.7 million.

Plan No. 2 called for an increase of 7 MMcf per day through the addition of two compressor plants on the existing line. Estimated annual cost for standby gas by 1951 would be $923,200.

The third plan, which called for the operation of both the existing line and the new Moreno line would cut annual standby gas costs to $5100.

The new LP-Gas plant, now being built, will be used only for standby purposes—either for peak load days or in case of breakdowns—and is large enough to supply 35 MMcf a day for two days.

During the recent emergency, San Diego's small LP-Gas standby plant's fuel supply was quickly exhausted. Additional sources of LP-Gas proved a real problem. Some had to be procured out-of-state at great distances and equally great expense. During San Diego's first major emergency during January, the butane-air vaporizer operated until midnight of the first cold day, then shut down as butane stocks were depleted.

Progress

A one-half mile section of the 85-mile Moreno line has already been laid. This is across Lake Hodges, a reservoir, and completion of this section was necessary while the lake was dry.

Gas quality from the suppliers must measure up to a minimum heating value of 950 Btu's per cu ft, wet basis, under contract. Other technical requirements call for no more than .25 of one grain of hydrogen sulphide, nor more than 5 grains of organic sulphur (mercaptans) per 100 cu ft.

Gas volume delivered shall be computed upon a pressure of 14.73 psia, with temperatures of 60°.

Combined resources of the Permian basin are estimated to exceed 2149 billion cu ft for the period of 1949-68. The San Diego extension will not call for added deliveries by El Paso to the Los Angeles companies, now contracted to deliver 305 MMcf per day under a proration agreement between El Paso, Southern Counties, SoCal, and PG&E.

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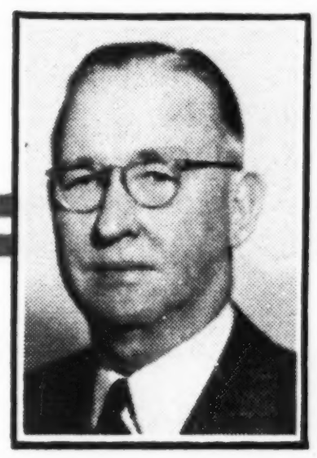

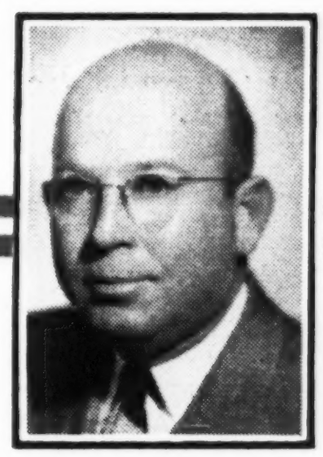

Worldwide pipelining Know How! Over 30,000 miles of pipe laid to *OK's* credit . . . more than enough pipe to encircle the globe . . . *OK* has practically done a globe-circling job with participation in putting through many of the world's greatest pipelines. That means invaluable experience . . . *OK* is the oldest pipeline contractor in the business, yet it is a "young 30 years (plus) of age" . . . what means more to executives in the market for pipeline construction, is the sum-total years of experience of the men in the organization . . . *OK* officers represent an aggregate of 129 years experience in the business, and that takes in the toughest jobs executed so far! Ample, specialized equipment in the hands of seasoned personnel, plus extensive scope of operations make it a "must" to call in *OK* when figuring any oil, gas or gasoline pipeline job.

THE MEN BEHIND EVERY *OK* JOB: *(starting at top center and continuing around) Thomas R. Jones, Chairman of the Board; Talmadge A. Hester, President; Paul R. Halbert, Vice President; Nelson K. McFarland, Secretary-Treasurer; R. J. O'Connell, Vice President.*

IT'S AN OK JOB . . .

IF Oklahoma Contracting does it!

Bulldozers clearing the right-of-way encountered plenty of rugged terrain.

Tulsa Company Line Taps Rich "Golden Trend"

By O. D. HALL

A major gas pipeline construction project has recently been completed by the Oklahoma Natural Gas Co., Tulsa, Okla. It involves the construction of 145 miles of natural gas transmission lines at a total cost of $3 million to the "Golden Trend" area of McClain, Garvin and Stephens counties of Oklahoma.

Exclusive

This new gas is made available to more than 100 communities on the company's system and not only will benefit domestic, commercial and industrial consumers on the entire system, but will add materially to the industrial growth of Oklahoma.

The Golden Trend area is one of the largest and most important oil and gas producing areas developed in Oklahoma in many years. Oklahoma Natural will furnish a market for residue natural gas from three natural gasoline plants being built cooperatively in Garvin county by the Carter Oil Co., Cities Service Oil Co., Warren Petroleum Co., and J. E. Crosbie Inc. The three plants are to be operated by Warren Petroleum Co. of Tulsa.

The natural gas in the great new Golden Trend area is produced in combination with oil, and contains a high proportion of natural gasoline which must be removed. A similar plant at Velma in Stephens county, Oklahoma, operated by the Skelly Oil Co., will also process gas it produces as well as gas it purchases from other producers in that area.

Thus the operating oil companies in this area and the Oklahoma Natural Gas Co. are combining their facilities to utilize completely the natural resources contained in the Golden Trend area. furnishing a striking example of modern conservation of oil and gas through the cooperation of a number of private enterprises.

Three major natural gas lines are included in this construction project from the new producing area:

1. A 16-in. pipeline has been built from Maysville, Garvin county, 66 miles northeast to a point about six miles east of Wewoka, where it connects with one of the company's present 16-in. lines.
2. A 12-in. pipeline from Maysville 34 miles west to a point near Chickasha connects with the company's lines which carry gas from the Cement-Chickasha producing area to Oklahoma City and other central and northern Oklahoma communities and via a high-pressure line to eastern Oklahoma.
3. From Maysville another 12-in. line has been run 30 miles south and west to Velma in Stephens county where it connects with the Skelly natural gasoline plant, and a 10-in. extension line from Velma 15 miles southward connects with the Ardmore district transmission system at a point about three miles west of Graham in Carter county.

Owing to scarcity of steel pipe Oklahoma Natural not only had to comb all the known markets to supply one-third of its needs but had to reclaim pipe from its other company lines.

Most of the country traversed by the new Oklahoma Natural pipelines is rough and hilly. Two suspension bridges were built to carry the 16-in. pipeline across the Washita river and Wewoka creek. The line crosses the South Canadian river on the highway bridge at Asher. In addition to these crossings, lines span 26 other streams or deep ravines by means of truss-type crossings. Crossings were made under a few streams.

The estimated supply of natural gas made available by connections to the Golden Trend producing area is sufficient to meet present fuel requirements of all the homes, industries, commercial establishments, offices, schools and other public buildings in a city the size of Oklahoma City for more than 40 years. Since gas processed in natural gasoline plants must be taken into the transmission system as fast as it is produced, the additional supply of gas from Garvin and Stephens counties flowing steadily into the transmission system will permit Oklahoma Natural to reduce the quantities of dry gas withdrawn from its reserves in the Cement-Chickasha and other producing areas, thus conserving and prolonging its reserves of dry gas.

At present in order to meet winter peak demands in northeastern and eastern Oklahoma, where very little natural gas is now produced, it is necessary in the summer to take gas out of the ground in Cement-Chickasha and other producing areas, transport it to northeastern Oklahoma, and put it back into the ground in the company's underground storage projects. Then in emergencies, or in extreme cold weather when peak demands for gas for heating in the northeastern part of the state exceed the capacity of the transmission lines, gas is withdrawn from the storage projects to supplement the supply available through transmission lines. The company has two large underground storages known as the Haskell and the Osage storages and other similar projects are being studied.

The contractor in charge of construction in the Golden Trend project was the Trojan Construction Co. of Oklahoma City. The coating contract was sublet to the Tulsa Pipe Coating Co., Tulsa.

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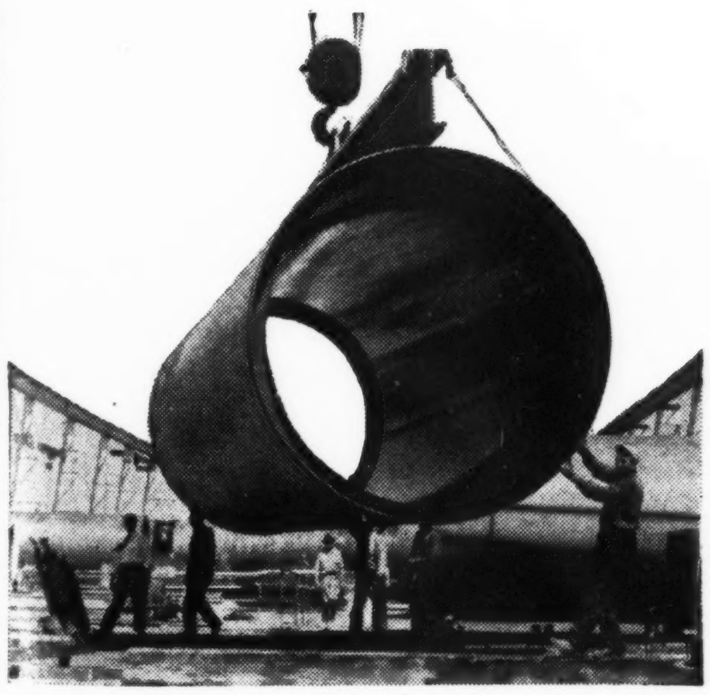

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Moreover, Barrett enamels possess sufficient flexibility and ductility to accommodate the "breathing" of the pipe, and to withstand the weight of the backfill when the pipe is not full of water.

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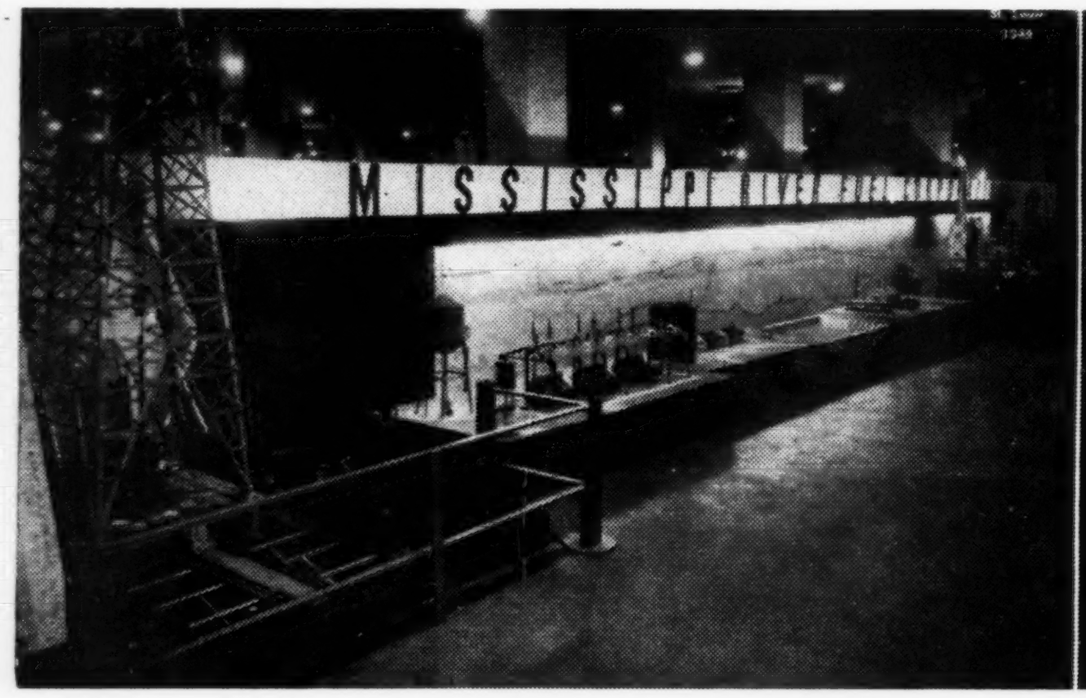


Part of Mississippi River Fuel Corp.'s exhibit at the Bildors Home Show is shown in these two views. The display traced the flow of natural gas from the ground to the ultimate consumer. Map in background shows location of pipeline and compressor stations.

Well-to-Consumer Flow of Gas Depicted at St. Louis Home Show

With the changeover to straight natural gas in St. Louis and St. Louis county, The Laclede Gas Light Co. and the Mississippi River Fuel Corp. presented some of the facts relating to this event in a coordinated display 180 ft long at the "Bildors" Home Show. The show, held Feb. 12-20 at Kiel auditorium, was a production of the Home Show of St. Louis Inc.

The integrated display showed how natural gas is brought to the area from wells in Louisiana and Texas fields, and is processed, transported, and distributed for industrial, commercial and domestic use in the metropolitan sector.

Mississippi River Fuel's exhibit featured everything used in the transportation of natural gas to the Laclede lines. The background was an enlarged map showing the location of the pipeline and compressor stations. The first unit was a rotary drilling rig showing the drilling operation in the gas fields, then a compressor station with gas scrubber, water tank, compressor engines, water cooling tower and company houses for employees. A river crossing in complete detail showed headers, river lines, river pipe clamps, and gate valves. Next was a typical warehouse for pipeline maintenance with pipe storage rack and service truck. The model industrial steam boiler showed one of the many uses of gas for power and processing. A display of some of the meters, regulators, gate valves and fittings required on this kind of pipeline was also included in Mississippi River's exhibit.

Laclede's display continued the story by announcing that $15 million would be spent by the company to bring natural gas to St. Louis, augmenting this with an appliance exhibit. The finale was a huge microscope through which one could see three pennies, emphasizing the fact that while it costs millions to give and bring gas service to St. Louisans, that tiny blue flame continues to be the biggest household bargain today.

Pipelines Under Construction

Loop for Los Angeles

Southern Counties Gas Co., Los Angeles, in mid-April started another link in the 30-in. loop line which will eventually carry Texas gas all the way around metropolitan Los Angeles. Total length of the new line, which will carry natural from the Texas line at nearby Rivera to distribution systems in southwestern Los Angeles, will be 15 miles.

The contracting firm of Alex Robertson, which is handling the job, will also install an additional 6½ miles of 30-in. pipe connecting with the company's 30-in. Pasadena line and running to a point a mile west of Puente. The line will be used to feed Texas natural into the company's San Gabriel Valley Div.; later on it will be joined to the Texas line near the air force's March field, forming one of the loops necessary to increase the daily delivery capacity of the Texas line to 405 MMcf. Total cost of the two jobs is around $800,000.

Angle Compressors Ordered

A $6 million order for 55 Clark 1600 bhp gas engine driven compressors has been given Clark Bros. Co. Inc., Olean, N. Y., by Fish Engineering Corp., Houston, Texas, contractors for Trans-Continental Gas Pipe Line Co. Batteries of the "Big Angle" compressors will be installed in pumping and booster stations along Trans - Con's Texas - New York 30 - in. line.

Part of the order is subject to the approval of the FPC.

Company officials estimate that since the introduction of the angle-type unit to the industry in 1937 the company has built and installed more than 2.2 million hp of these gas engine driven compressors. The basic designs were created in part as far back as 1919, when Clark Bros. built its first direct-connected two-cycle compressor. Clark Bros. Co. Inc. is a subsidiary of Dresser Industries Inc.

Columbia Financing Set

Columbia Gas System Inc.'s 1948 construction program will be financed in part through the sale of $20 million of debentures due in 1974. Estimated cost of this year's program is $57.2 million.

Biggest item on Columbia's docket is a 268-mile, 26-in. transmission line serving the demands of the Washington, D.C. area. Cost is set in excess of $22 million.

Additional construction and storage plans for 1950 will depend on the growth of demand for gas, and probably will not be as expensive as the 1949 projects. Although all major projects now contemplated by Columbia are scheduled for completion by the end of next year, increased demand may necessitate additional construction.

Northwestern Utilities Expands

Northwestern Utilities Ltd., Edmonton, Alberta, was scheduled to start work at the end of April on its 1949 $2.5 million expansion program.

The program includes installation of 14 miles of gathering lines in the Viking-Kinsella fields, and drilling of five additional wells. When completed, the company will have 57 producing wells in the field, with an open flow capacity of 765 MMcf daily.

Work on installation of approximately 4000 service lines in Edmonton and other centers on the company's pipelines also was scheduled to get under way at the end of the month. Edmonton would get 3300 of these service lines and the balance would be installed in such towns as Red Deer, Camrose, Ponoka, Lacombe, and Wetaskiwin. Last year 4108 service lines were installed in Edmonton.

Approximately 17.7 miles of 16-in. transmission line will be laid to complete the third transmission line to Edmonton from the Viking-Kinsella field.

First shipment of the 40 miles of pipe ordered last year from British firms arrived recently in Vancouver. This pipe will be utilized in construction of the third transmission line. Warehouse and shops, construction of which started last year, are nearing completion and will be ready for occupancy by mid-summer. The structure will cost approximately $200,000.

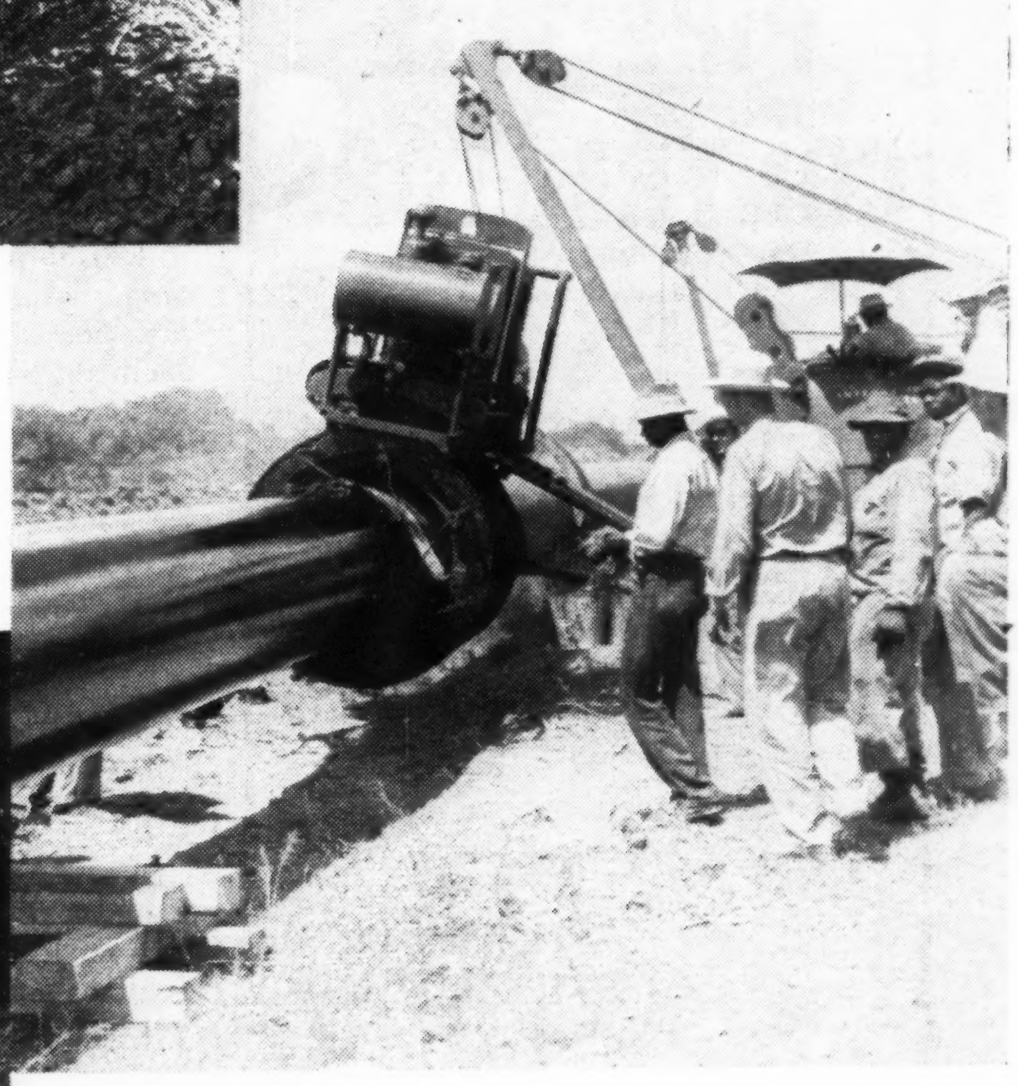
PIPELINE PROGRESS

TOP LEFT: A tough pipeline operation received editorial recognition in a recent issue of Saturday Evening Post. Officials of Williams Bros., which contracted the job—in Bolivia's jungles—G. S. Connors, left, and Cecil Stanfield, study article with W. B. Thompson, Curtis Publishing Co.

ABOVE: 24-in. line laid for Tennessee Gas Transmission Co. by the Oklahoma Contracting Co. Inc., shown as it lay ready for lowering in West Virginia.

ABOVE: Ahead of the wrapping and lowering-in crews on Lone Star Gas Co.'s 40-mile line in northeast Texas. Pipe was completed in a record 30-day period.

AT RIGHT: Cleaning and priming machine operations on Tennessee Gas 30- and 31-in. loops. Locale was along 54-mile section running from Fairdale, Texas, to Natchitoches, La. H. C. Price Co. was the contractor.



AT LEFT: Pipe lies ready for lowering in on Price job for Southern Natural Gas Co. The scene depicted is near Birmingham, Ala., on route of 35-mile, 24-in. line.

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HOUSTON, TEXAS

Route of the extension to Milwaukee being built by Michigan-Wisconsin Pipe Line Co. is shown above. Plans call for completion of the dotted portions by July 1, 1950.

Milwaukee Line Under Way

The line which will connect Milwaukee with Michigan - Wisconsin Pipe Line Co.'s Texas-to-Michigan line at Millbrook, Ill. (the "Wisconsin Junction") is under construction. The laying of 40-ft sections of natural gas-carrying pipe began in March at a point about 105 miles north of the Wisconsin-Illinois border and some 15 miles west of Milwaukee. Somewhat more than one-half of the main line from Hansford, Texas, has been completed.

On the job near Calhoun, Wis., two 25-ton ditch diggers are reaming out 5-ft ditches while pipe-cleaning machines and welding machines are in full operation. Some materials are scarce in the Wisconsin area, according to old hands at the job, but there is good supply of 22-in. pipe from the A. O. Smith Corp., whose plant is only a few miles away from the start of operations in the Brookfield-Calhoun area.

Original plans called for completion of the line to Milwaukee by July 1, 1950.

In mid - March Michigan - Wisconsin and Michigan Consolidated Gas Co. (both of Detroit) asked the FPC for authorization to boost compressor power of the long line from 15,600 hp to 48,000 hp. The original power would have given delivery of about 47 billion cu ft annually; the added power would shoot another 28 billion cu ft through the line.

BU Plans for Texas Gas

Brooklyn Union Gas Co. will begin work this year on its portion of the pipeline facilities which will enable it to receive natural gas from Trans-Continental Pipe Line Co.'s Texas-to-New York line. Deliveries are scheduled to start one year from this fall.

Alterations in the company's plants plus the necessary pipelines will cost Brooklyn Union about $4.5 million, according to Clifford E. Paige, chairman of the board. He also stated that the company's total expansion program is almost completed, with $22 million out of a scheduled $25 million spent by the end of 1948.

Argentine Line Nearly Ready

A 1050-mile, 10½-in. Argentine gas pipeline is nearing completion. The line, one of the most important projects in the Argentine government's five-year construction program, runs from the Comodoro Rivadavia oil fields in Chubut, a southern Argentine province, to Buenos Aires.

The line was started in February, 1947, and will be finished by August or earlier. Lack of materials slowed construction speed.

One of the longest lines in the world, the system reportedly has the most powerful pumping station of any such project. Pipe walls are made 2½-in. thick in order to handle the high pressures.

Michigan Gas Storage Builds

A 61-mile, 20-in. natural gas pipeline is being constructed for the Michigan Gas Storage Co. from Freedom Junction to Laingsburg, in the southeastern Michigan area. Scheduled to be finished by mid-summer, next year it's to be extended to Mt. Pleasant.

At Mt. Pleasant it will connect with present pipelines leading to natural gas storage fields at the Clare-Missaukee-Osceola counties intersection. Construction of a 14-mile branch line between Laingsburg and Lansing is also on this year's schedule.

Progress Reports

TENNESSEE GAS TRANSMISSION CO. has let a contract for the construction of 62 miles of 24- and 30-in. line starting near Refugio, Texas, to a point near Victoria, Texas. Also in the works by the H. C. Price Co. and Betchtel Corp. are two major river crossings at the San Antonio and Guadalupe rivers.

STANOLIND OIL & GAS CO. is having Deaton & Sons Inc., Odessa, Texas, construct 137 miles of gas gathering line in the vicinity of Ulysses, Kan. Pipe size ranges from 22-in. down to 4-in. Four thousand feet of 8-in. river crossing at the Cameron river is included in the project. Construction should be completed this month.

CITIES SERVICE'S 130-mile, 26-in. line from Hutchinson to Ottawa, Kan., is being worked on by R. H. Fulton & Co., who began clearing right-of-way March 31.

MICHIGAN-WISCONSIN PIPE LINE CO.'S 455-mile, 24-in. line from Hansford county, Texas, to Marysville, Mo., is being done by J. R. Horrigan Construction Co.

MISSISSIPPI RIVER FUEL CORP. will let contracts soon on 221 miles of loops between Monroe, La., and St. Louis.

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NORTHERN NATURAL GAS CO. took bids in March for a total of 174 miles of 16-, 20-, and 24-in. pipeline in various sections of Kansas, Iowa, Minnesota, and Nebraska.

THE U. S. ATOMIC ENERGY COMMISSION took bids last month on a 95-mile stretch of 12-in. line from an existing line 35 miles south of Bloomfield, N. Mex., to Los Alamos.

UNITED GAS PIPE LINE CO., Shreveport, La., asked the Army Corps of Engineers in mid-March for permission to lay a 20-in. pipeline across the Escatawpa river near Wilmer, Ala. The company is preparing to bring natural from the Baxterville, Miss., fields to Mobile, Ala.

MICHIGAN-WISCONSIN PIPE LINE CO.'S compressor station near Guymon, Okla., should be completed by mid-summer. Plans for the plant include the installation of 13 1000-hp compressors.

TEXAS GAS TRANSMISSION CO. recently let contracts for 80 miles of 26-in. line in Jefferson county, Indiana, and Warren county, Ohio, to Midwestern Constructors Inc. Construction was scheduled to begin the first of this month.

TEXOMA NATURAL GAS PIPELINE CO. began construction in mid-April of additional facilities to its gasoline plant and dehydration plant, station No. 21, Fritch, Texas.

TRANS-CONTINENTAL GAS PIPE LINE CO. is having Midwestern Constructors Inc. double-joint 15 miles of 30-in. pipe, with a field shop established at Columbia, Miss., where double joints are made. This is experimental work, using the Lincoln submerged arc weld.

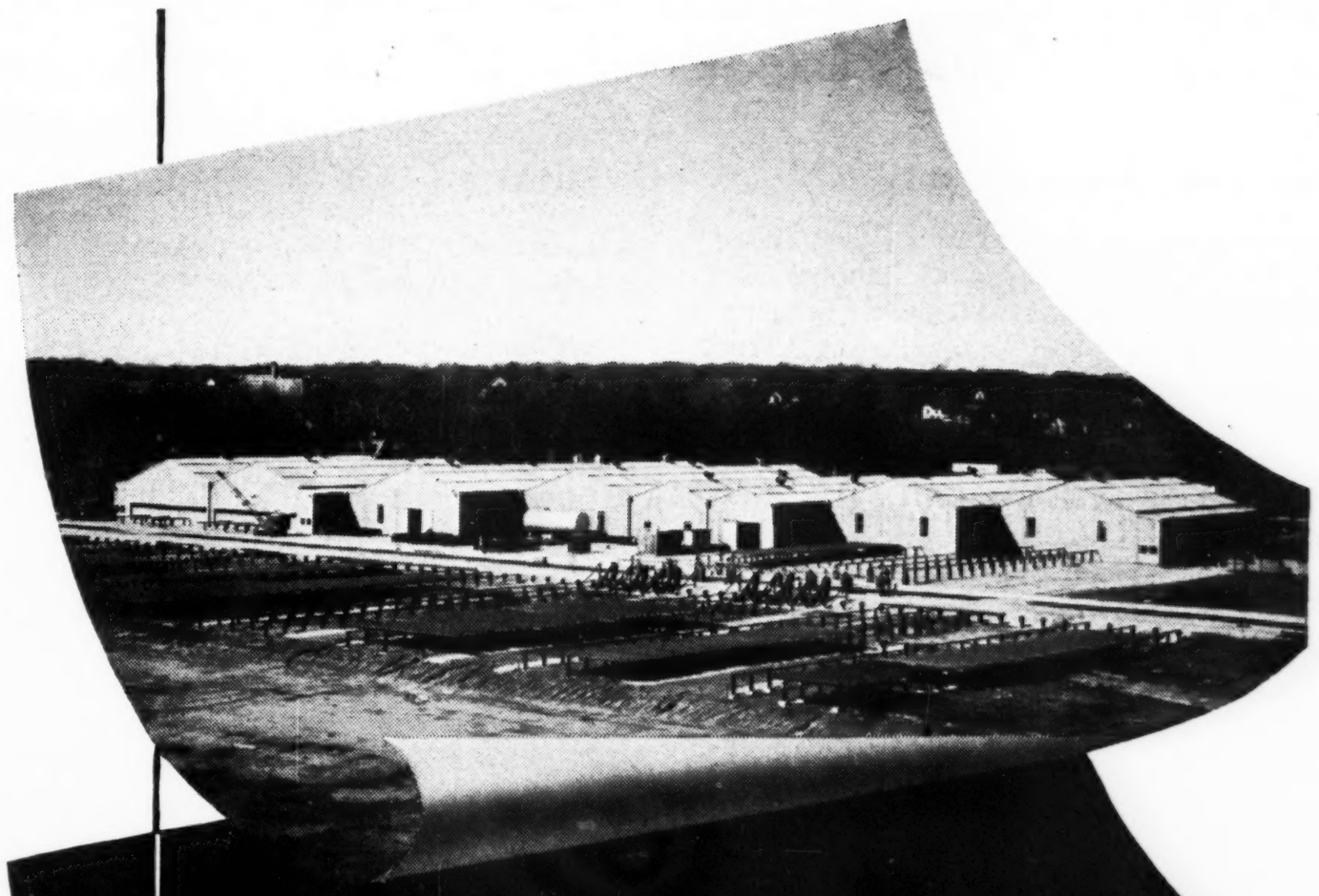
ATLANTIC SEABOARD CORP. AND VIRGINIA GAS TRANSMISSION CORP.'S line is being worked on by H. C. Price Co. at these points: 68 miles of 26-in. line starting near mouth of Seneca, W. Va., to a point near Cleveland, W. Va.; 70 miles of 26-in. line from the mouth of Seneca to a point near Strasburg, Va.; and 68 miles of 26-in. line starting near Strasburg to Atlantic Seaboard's main line near Rockville, Md. The company is also working on two major river crossings, consisting of four 16-in. lines across the Potomac and Shenandoah rivers.

DOW CHEMICAL CO. is having a 15-mile, 4-in. line built in the Bay City, Texas, area by Latex Construction Co.

PANHANDLE EASTERN PIPE LINE CO. has awarded a contract to R. H. Fulton & Co., Lubbock, Texas, for six loops in Kansas on the Texas-Michigan line. Fulton will put in about 74 miles of 26- and 30-in. pipe.

C. L. BROWN is constructing a 35-mile, 4-in. line from Fairfield field to Mexia field in east central Texas to supply gas for pumping leases in Mexia field.

OTHER ANNOUNCEMENTS of contracts expected soon will be from: Trans-Continental Gas Pipe Line Co., 600 miles of Texas-to-New York line . . . Tennessee Gas Transmission Co., 200 miles of looping . . . Texas Gas Transmission Co., 600 miles of 26-in. line, Memphis-to-Middletown, Ohio.



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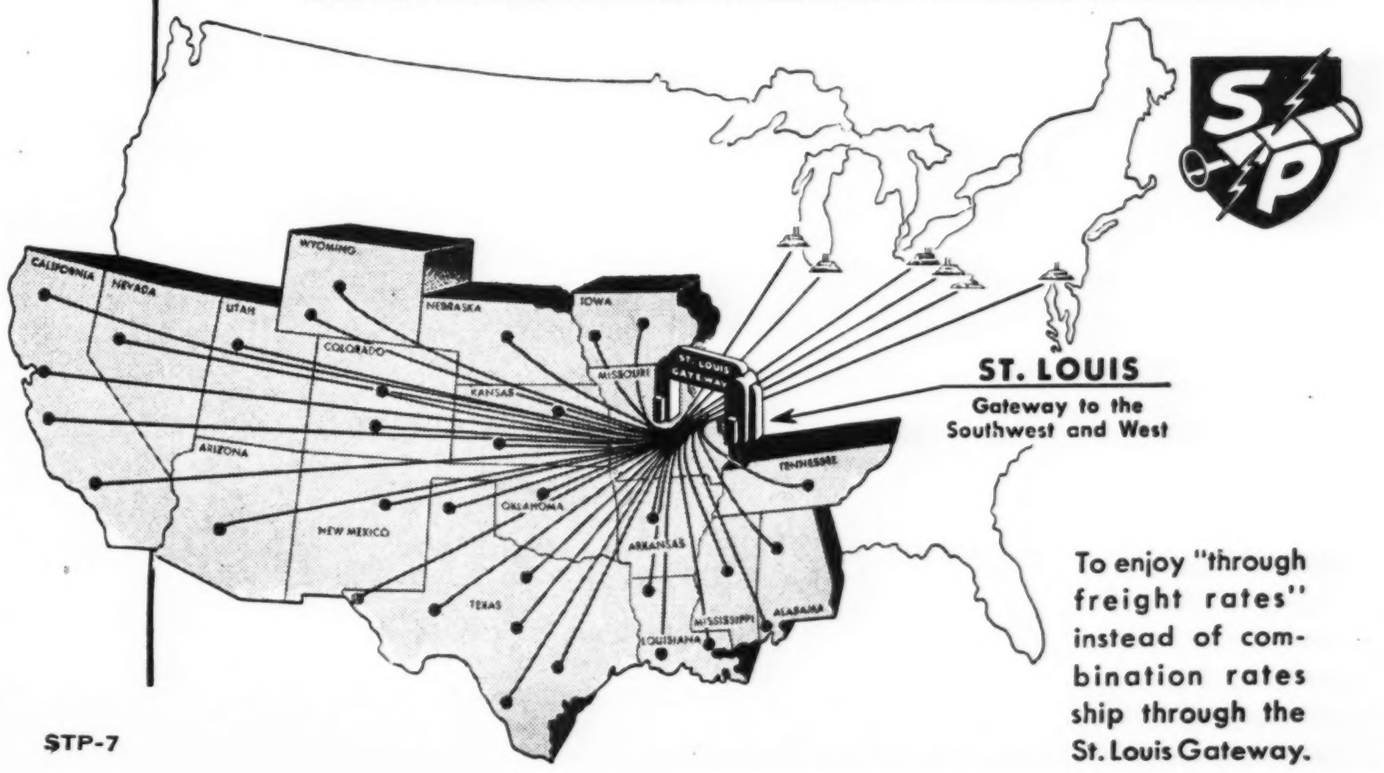

STP-7

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Applications Awaiting Approval

Ohio Fuel Replacement

A subsidiary of the Columbia Gas System Inc., the Ohio Fuel Gas Co., Columbus, asked the FPC at the end of March to authorize construction of 85.5 miles of pipeline in central Ohio to replace about 84 miles of line which Ohio Fuel wants to retire. Estimated cost of the project has been set at $4.1 million, and would be financed through the parent company.

According to Ohio Fuel, the new facilities would provide increased capacity for gas transported in the summer from out-of-state sources to underground storage areas for winter delivery. The company indicated in a later application it would seek a commission okay for future expansion of its gas storage facilities.

Home and Eastern Apply

Home Gas Co. and Eastern Pipe Line Co., two other subsidiaries of Columbia Gas (home offices in Pittsburgh), filed a joint application March 30 with the FPC which asked authorization for the construction, retirement, and sale of certain facilities of the New York and New Jersey systems of the two companies.

Home Gas wants to build about 70 miles of pipeline in southeastern New York; to retire about 44 miles which forms an 11-mile transmission system in this area; and to sell approximately 10 miles of pipeline in the Cattaragus county section of southwestern New York to the Keystone Gas Co. Inc.

Eastern Pipe wants to retire a pipeline system which extends 50 miles southeast through New Jersey from a point on the N.Y.-N.J. line to another point on the line in Bergen county, N.J. The application noted that the facilities the companies propose to retire will not be necessary if Home Gas' construction program is okayed. No new customers would be served; Eastern serves no customers in New Jersey and uses its line solely to transport gas to Home Gas' customers in Rockland county, N.Y.

Estimated cost of the project is $2.5 million. Home Gas proposes to finance construction with $600,000 of its own funds and borrow the rest from its parent.

Natural Asked for Baltimore

Another subsidiary of the Columbia Gas System Inc., Atlantic Seaboard Corp. of Charleston, W. Va., has asked the FPC for authorization to sell and deliver natural gas to Consolidated Gas Electric Light & Power Co. of Baltimore, constructing not more than five measuring and regulating stations to measure the gas proposed for delivery. Cost of the project is estimated at $181,000, which would be taken from funds on hand.

Atlantic Seaboard recently received the commission's okay to construct additional facilities to supply increasing requirements of its existing customers, and at that time the FPC pointed out that the company couldn't supply new markets without "excessively" curtailing requirements of existing Columbia system customers. The FPC so authorized deliveries to these outlets. Atlantic Seaboard's new application says that Consolidated Gas has revised downward its estimates of the gas it will require through 1953 and hence Atlantic Seaboard will be able to serve it without impairing service to existing customers. This hinges on the expected receipt of natural which the Columbia system is to receive from Tennessee Gas Transmission Co., Texas Eastern Transmission Corp., and Texas Gas Transmission Corp.

No. Natural to Up Capacity

Northern Natural Gas Co. (Omaha) wants to spend about $27 million on the construction of additional natural gas facilities which would boost capacity of the company's system north of Kansas by some 60 MMcf daily, and has asked the FPC for construction and operation authorization. Northern Natural wants to construct about 327 miles of pipeline in Kansas, Nebraska, and Iowa; to build a dehydration plant at Garden City, Kan.; and to install 10 compressor units with a total of 16,000 hp.

The company's system now has a capacity of 425 MMcf daily north of Kansas. Northern Natural lately received FPC authorization to boost this to about 470 MMcf; facilities should be completed this year. The company says it needs the new facilities to meet demands of the 1950-51 heating season.

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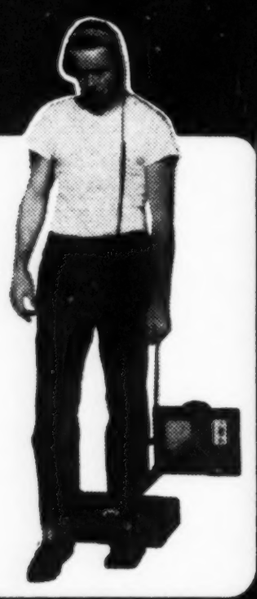

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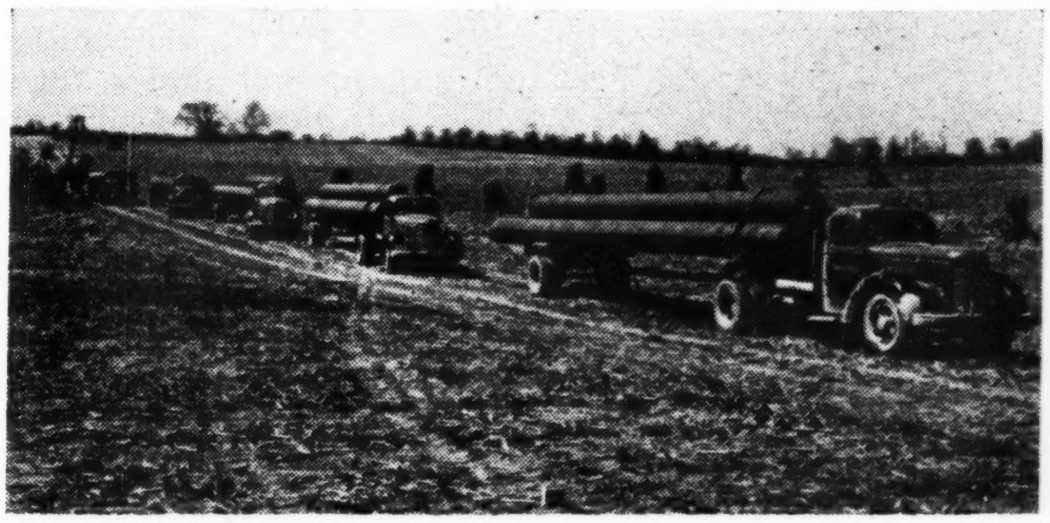
Texas Empire Pipe Line Co.	70	18"
Texas Gas Transmission Co.	180	26"
Virginia Gas Transmission Co.	65	26"
Northern Natural Gas Co.	60	24"
Buckeye Pipe Line Co.	68	22"
Mississippi River Fuel Co.	215	22"
Stanolind Oil & Gas Co.	150	Various
TOTAL	808	

PARKHILL JOBS NOW UNDER WAY

Shell Pipe Line Co.	406	22"
Texas Pipe Line Co.	170	22"



Parkhill Truck Company is not only moving along with the Gas Industry in its effort to keep pace with growing industrial and domestic use of natural and manufactured gas in all sections of the country; it is moving a lot of pipe for new lines now under construction.

Parkhill has recently been awarded contracts for 808 miles of big lines and has under way the job of stringing pipe on two important lines.

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One pipeline spread of Latex Construction Company laid and took-up 418 miles of pipe during our fiscal year ending Nov. 30, 1948 . . . demonstrating the value of combining years of experience and specialization with a well integrated organization for more efficient pipeline construction.

The mileage of pipeline work done by this one spread was divided as follows:
Miles of Pipe laid, 16" and larger.....306
Miles of Pipe laid, 8", 10" and 12"... 62
Miles of Pipe taken-up and reconditioned.. 50

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Piedmont Asks Amendment

The Gulf Coast-Piedmont area pipeline, which is to serve the densely populated and highly industrialized Piedmont plateau area in South Carolina, North Carolina, and Virginia, should be quite a bit larger and extend into the Tidewater section of Virginia, according to the Piedmont Natural Gas Corp. of Spartanburg, S. C. The company has filed an amended application with the FPC, supplanting the original petition filed last August (see *GAS,* Jan., 1949, p. 46).

Originally scheduled to be about 990 miles long and bringing 215 MMcf daily into the area, the line as it is now planned will be 1290 miles in length and deliver 275 MMcf daily. Instead of stopping in the vicinity of Danville, Va., the line will now extend farther into southeastern Virginia, where two pipelines would diverge, one going to Richmond, the other to Norfolk.

Estimated cost of the project is $97 million; first cost planned was about $75 million. The issuance of bonds, preferred and common stock, and bank loans will finance construction.

Indianapolis Lateral

In early April the City of Indianapolis asked the FPC for authorization to construct and operate a 55-mile 16-in. line from Texas Eastern Transmission Corp.'s line in Indiana to the Indianapolis city plant. This petition is an amendment to an application filed by the city last July when it asked the FPC to require delivery or sale of 10 MMcf daily to it by Texas Eastern, Panhandle, Texas Gas Transmission Corp., or Tennessee Gas Transmission Co. The original application also asked that the FPC order either Texas Eastern or Panhandle to let the city hook up with one of the two companies' systems.

This last, amended application says that the city will finance construction cost of the facilities ($2.4 million) from its own funds, and sets the proposed line delivery capacity at 50 MMcf daily.

Shenandoah Gas Chartered

The Shenandoah Gas Co. has been granted a charter by the Virginia State Corporation Commission. Application of the company revealed plans to construct a 26-in. pipeline through a string of northern Virginia communities. The line would be connected with the line of the Cobb, W. Va.-Rockville, Md. system.

The charter granted provides for a maximum capital stock of $25,000, but grants the board of directors of the company the right to increase the amount as they see fit by amendment of the original charter. J. Howard Myers, Martinsburg, Va., is president of Shenandoah.

San Juan Case Reopened

Last February the FPC turned down an application from the San Juan Pipe Line Co. which asked that the company be allowed to construct a 449-mile 26-in. line from the San Juan Basin to a point near the Arizona-California border. San Juan planned to deliver natural to El Paso Natural Gas Co., its parent, the gas to be added to Permian Basin gas transmitted by El Paso and then sold to Pacific Gas & Electric Co. for use in central and northern California (see *GAS,* April, 1949, p. 33).

Now El Paso has asked the FPC to authorize practically the same line, citing an expected gas shortage in the San Francisco bay area in 1951. The line would be 24-in. pipe, 451 miles long, and initially deliver 150 MMcf daily to the Arizona connection with El Paso's system. In addition to the main transmission line, the proposed project would include 101 miles of feeder line, two compresor stations with a total of 6300 hp, a natural gasoline extraction plant, and a gas dehydration plant.

The $28 million project would be financed through the sale of $18.5 million in bonds, a $5 million bank loan, and $4.5 million from company funds.

Pipeline Newsnotes

The mills ground slowly, but the FPC has finally gotten around to dismissing, for lack of jurisdiction, Border Pipe Line Co.'s 1942 application for authorization to construct and operate natural gas facilities which carry gas to a point near the U.S.-Mexico border, where it is subsequently exported. The facilities were completed and in operation by June, 1943.

The U.S. Court of Appeals for the District of Columbia ruled last November that the company was not a natural gas company within the meaning of the Natural Gas Act. Action was taken by Border Pipe after the FPC had tried to establish jurisdiction over the company.

Border Pipe sells gas to American Smelting & Refining Co., which owns a zinc smelter south of the border.

* * *

Tentative surveys of the proposed site of a $3 million gas distillate plant near Ruston, La., have been made for the Arkansas-Louisiana Gas Co. Construction is expected to begin within the next few months.

The plant will be built in the newly-opened Dubach gas fields, on a site about six miles north of Ruston. The plant will be designed to produce propane, butane, gasoline, and other petroleum products. It will be the third multi-million dollar distillate center in this area.

* * *

A 4-in. line from the Tippett field in northwestern Crockett county, Texas, to McCamey, Upton county, has been surveyed by Southern Union Gas Co., Dallas. Construction is expected to start within the next two months. Cost of the project is estimated at $120,000.

Currently available is the output of seven wells producing gas with oil, while the output of another well which produces gas only, will be held in reserve.

* * *

The booster station at Ibex, Texas, has been closed by the Lone Star Gas Co. after 24 years of operation. Decline of gas production in east Shackleford county was responsible for the closing.

When it was built, the plant was the largest booster station on the Lone Star system. It was on the state's first big gas trunk line, pumping gas to the Dallas-Fort Worth area. Lone Star took gas from the old Landreth absorption plant.

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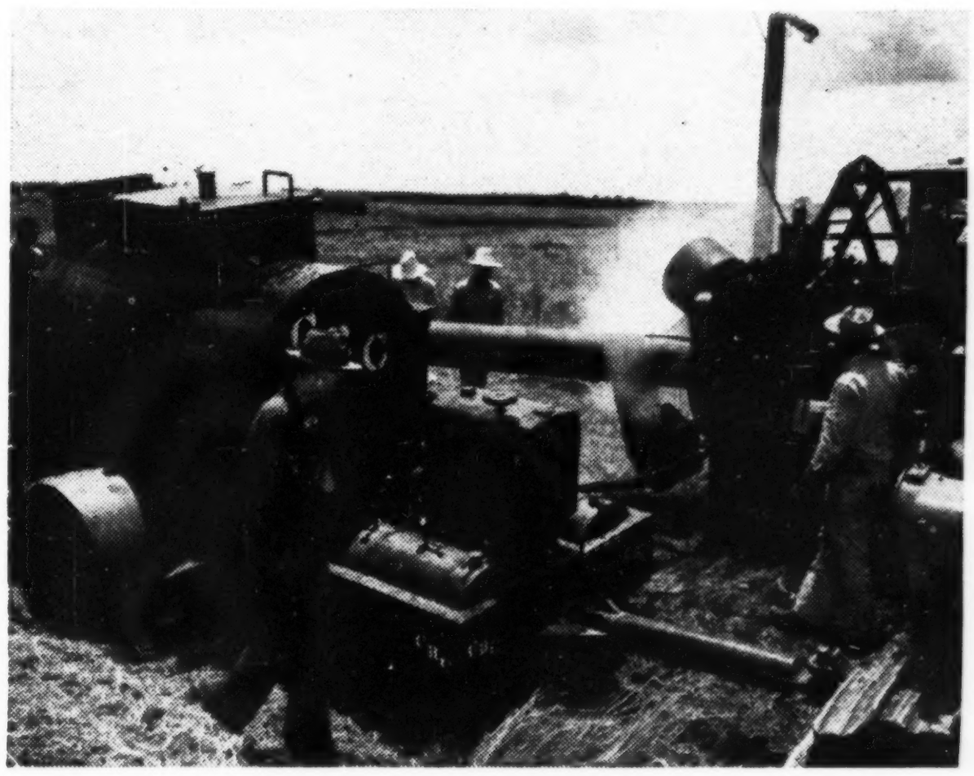

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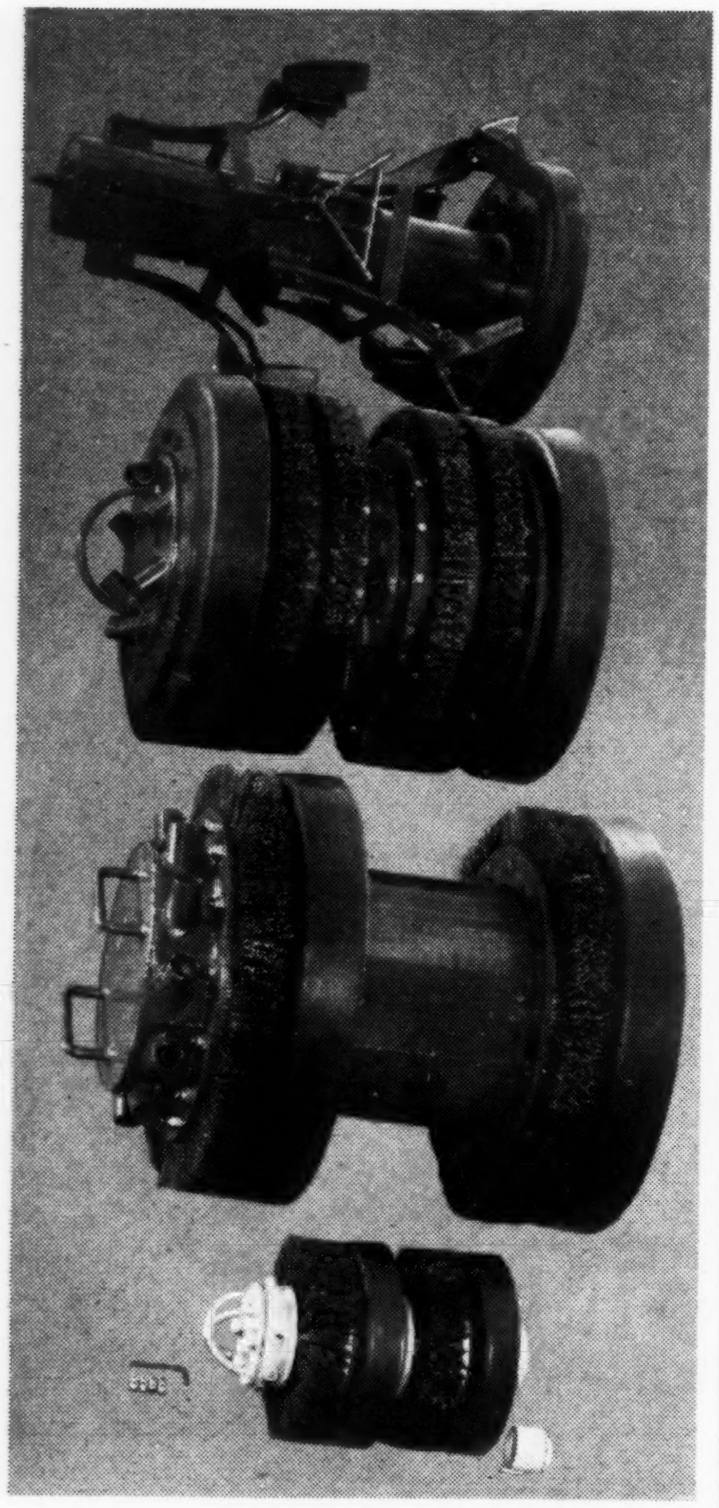

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*Patents pending

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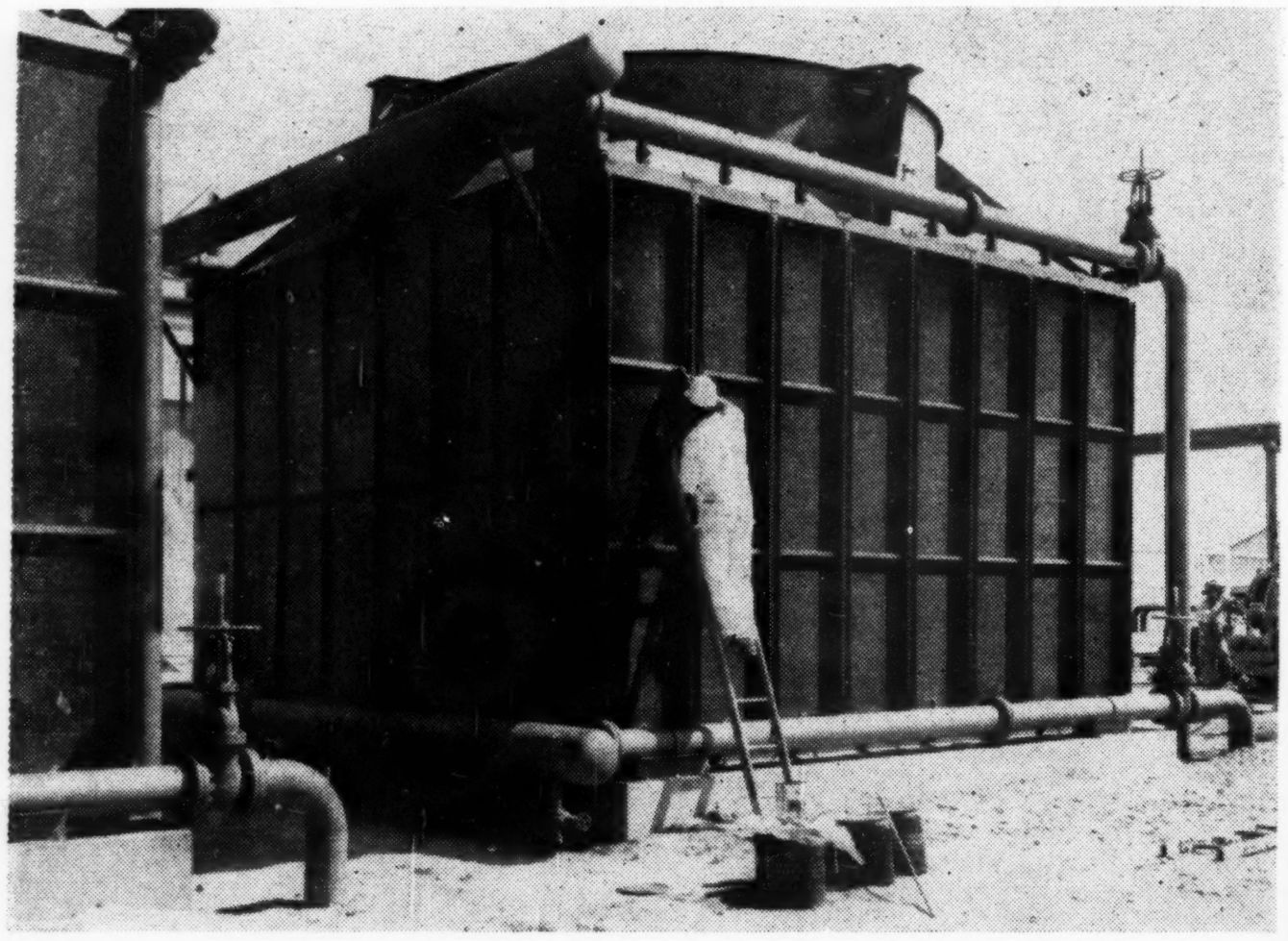

Huge Radiators Installed at Oklahoma Plant

Three mammoth radiators, said to be the largest of their type in the world and powered by propeller-like fans with a spread of 16 ft, have been installed as the first unit of a system of three gasoline plants, which will produce 300,000 gal of gasoline and other products daily.

The radiators keep water circulating in the cylinders of the Cooper-Bessemer and Clark compressor units at average temperatures of 160°, and perform the functions of cooling towers. There is one radiator for each of the compressors, which take gas from the gathering lines and deliver it into the transmission lines of the Oklahoma Natural Gas Co. in that area.

The plants, located in the Maysville, East Lindsay and Antioch fields of Oklahoma, when completed sometime this year, will be capable of handling 85 MMcf of gas every day, gathered from five nearby oil fields.

The system is an important conservation project. Gas will first be processed for gasoline, propane and butane; then part of it will be injected back into the oil producing sands to maintain pressure and increase oil production, and the remainder will be delivered to gas pipelines.

Operated by the Warren Petroleum Corp., the system is jointly owned by the Carter Oil Co., Cities Service Oil Co., Sinclair Oil Co., J. E. Crosbie Inc., and Warren.

Texas-Ohio Line

(Continued from page 93)

deliveries be made to East Ohio, Ohio Fuel Gas, and Manufacturers, but the FPC ruled otherwise.

Texas Gas also plans to increase sendout to existing customers in Greenville and Shelbyville, Miss.; Owensboro, Bowling Green, Franklin and Madisonville, Ky.; and Terre Haute, Bloomington, and Columbus, Ind.

Not unlike other major pipeline companies who have anticipated the FPC on certification, Texas Gas was on its mark when approval was given. Pipe had been strung along much of the right-of-way for months; 65% of the total right-of-way had been procured; financing was accomplished, and six contractors were standing by to start work in eight spreads. By virtue of its forehandedness, the company will be able to push 304 MMcf a day through the line in its first winter of operation.

A 63-mile section of Texas Gas' portion of the project between Lula, Miss., and Memphis has been completed and is in operation. Contracts for the remainder of the work have been let as follows:

1. Line from Carthage to Lisbon—N. A. Sight Co., San Antonio.
2. Lisbon to Mississippi at a point near Greenville—Latex Construction Co., Houston, two spreads.
3. Mississippi river crossing to Lula—O. C. Whittaker Co., Forth Worth.
4. Memphis to Slaughters, Ky, 210 miles—Horrigan Construction Co., Houston, two spreads.
5. Slaughters to the Ohio river near Louisville, 180 miles—Williams Brothers Corp., Tulsa, two spreads.
6. Louisville to connection with Texas Eastern at Lebanon—Midwestern Construction Co. Inc., Tulsa.
7. Compressor station construction—Stone & Webster Engineering Corp.

When the new line is completed Texas Gas' entire system will have a total capacity of 650 MMcf per day.

Texas Gas will cross 17 rivers, will use 175,000 tons of steel pipe, and will carry gas that will eventually wind up as far north as Syracuse, N. Y.